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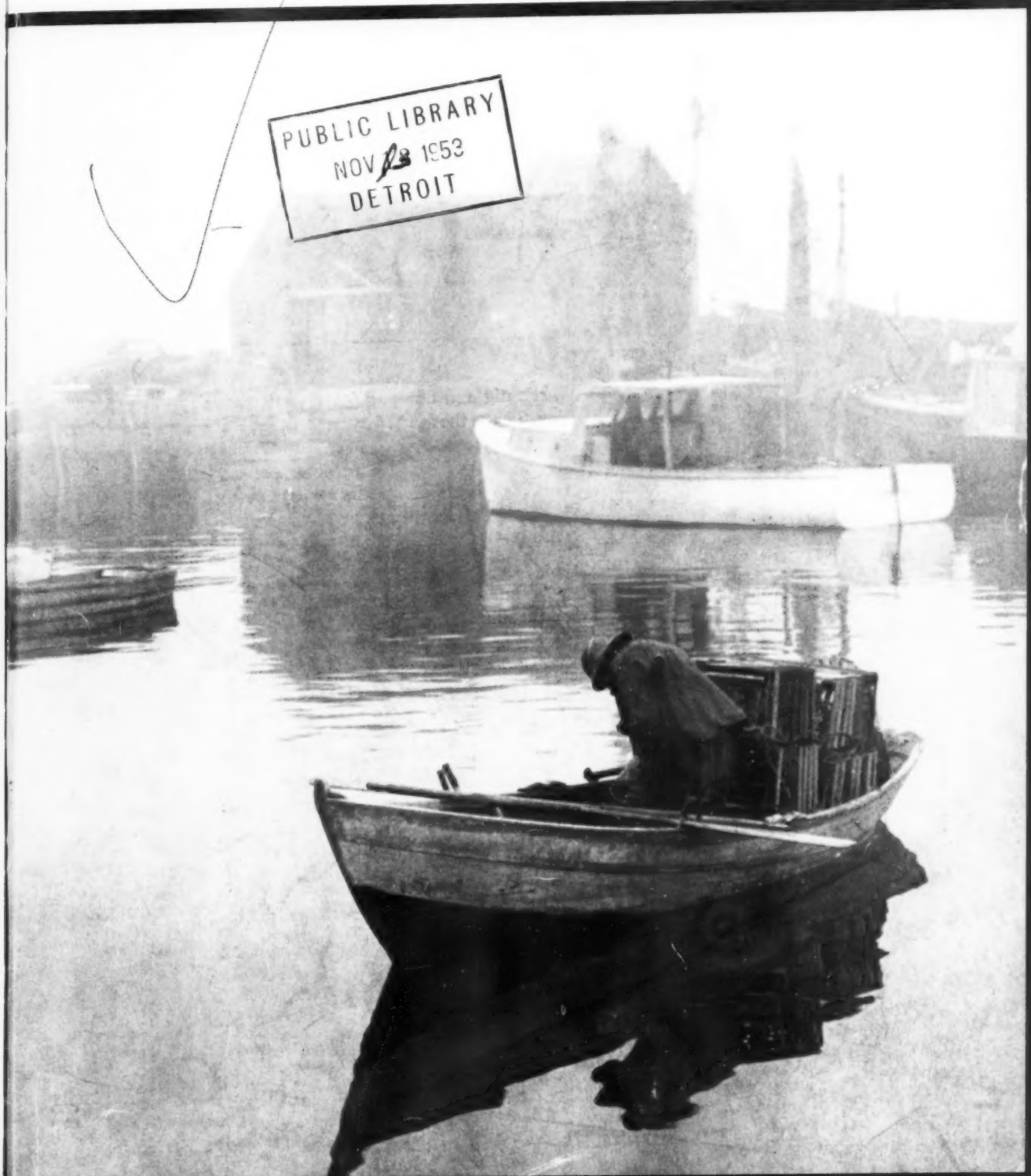
TECHNOLOGY REVIEW

November 1953



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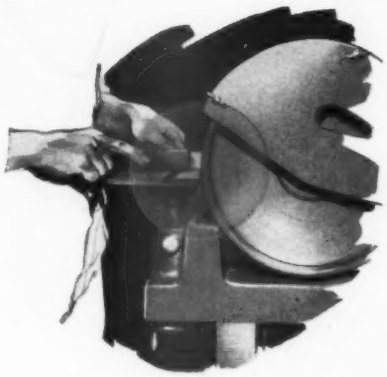

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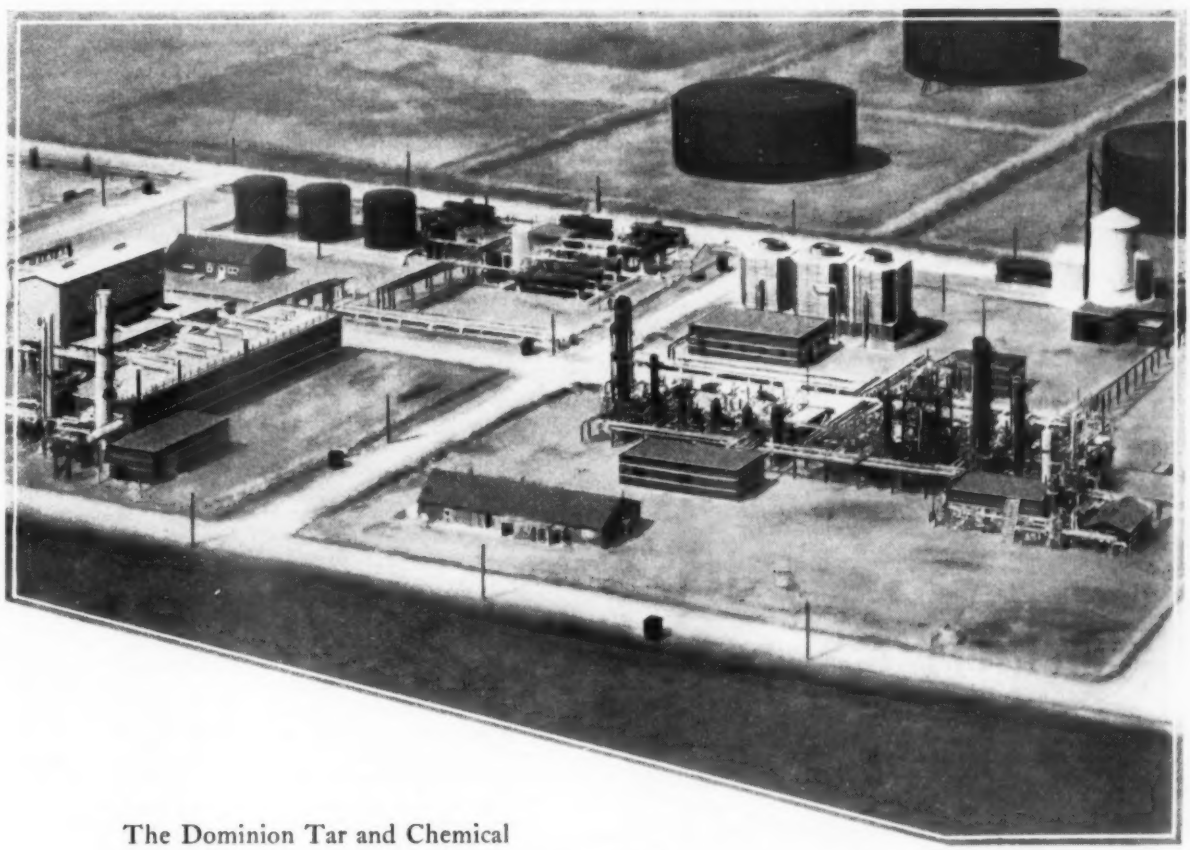

The Dominion Tar and Chemical Company's new plant at Montreal produces ethylene oxide, a component of detergents, solvents and plastics; and glycol, basic chemical in permanent type anti-freeze, explosives and synthetic fibers.

Design and construction of the plant, which has an estimated capacity of 25 million pounds of glycol per year, were by Stone & Webster Canada Limited, utilizing the facilities of Badger Process Division of Stone & Webster Engineering Corporation.

At this plant, located near the St. Lawrence River, Dominion Tar and Chemical Company extracts ethylene from gas piped from nearby refineries, converts it to form ethylene oxide and glycol, and returns the unused gas for further processing.

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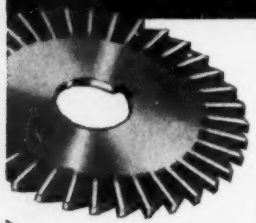

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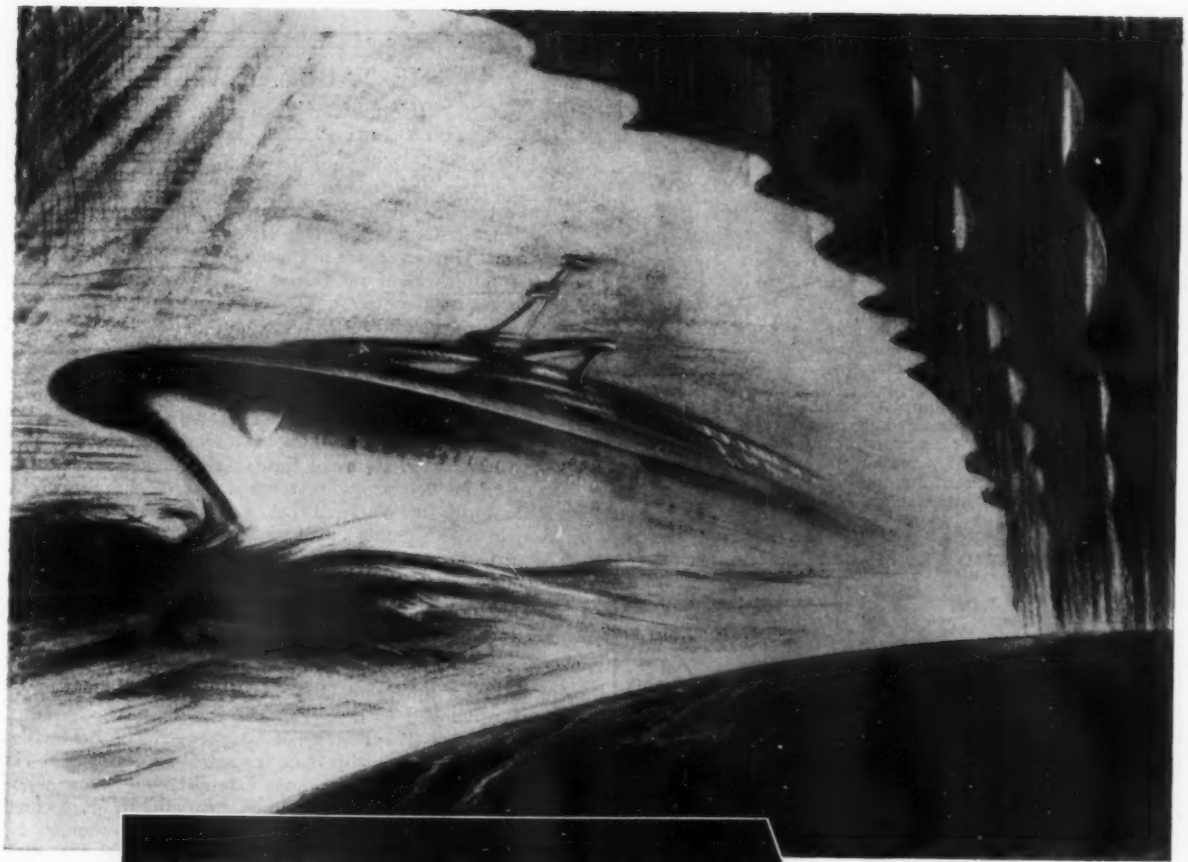
THE TABULAR VIEW

Human Equation. – As the educational doors fling wide again at the beginning of the fall term, ADMIRAL BEN MOREELL opens Volume 56 of The Review with his article appropriately bearing the title "Engineers and Engineering Education" (page 15). Admiral Moreell finds those who leave engineering schools to be well taught in the technical topics of their profession. But engineers must deal with people as well as with materials and ideas, and collegiate instruction on the engineers' responsibilities to their fellow man have left something to be desired. Recalling that the signers of the Declaration of Independence regarded that government best which left as much freedom as possible to the individual, Admiral Moreell warns of unrestrained bureaucracy and stresses the need to instruct engineers in the functions of government as well as in their obligations to society at large. Admiral Moreell, chairman of the Board of Jones and Laughlin Steel Corporation received a degree in civil engineering from Washington University in St. Louis in 1913. After four years' experience on construction projects in St. Louis, he started his naval career, advanced to the position of Chief of the Bureau of Yards and Docks (1937-1945), and became the Navy's youngest vice-admiral at the age of 51. He is the recipient of the Distinguished Service Medal, the Legion of Merit, membership in honorary scientific and engineering societies, and honorary doctor's degrees from 10 universities. Through the good auspices of the M.I.T. Club of Western Pennsylvania, The Review is able to include this article which Admiral Moreell delivered as a speech to the Pittsburgh group last May.

Individuality Is a Horrid Word. – The modern characteristics of that segment of our society that has generally been regarded as the backbone of the nation are examined by JULIAN A. JOFFE, '24, in his article "An Appraisal of Suburban Middle Class Life" (page 17). Selecting the suburbanite as the typical example of the upper-middle class type of citizen whose economic security is exceedingly tenuous, Mr. Joffe's study of this group decries the ostentatious display, the indulgence of children, and the uniform conformity to mediocrity which he observes. As the populace blithely accepts, as a normal part of their lives, such things as the leveling effects of mass communication, compulsory social-security laws, low-cost housing at public expense, and progressively high taxes that increasingly diminish personal incentive, Mr. Joffe sees a metamorphosis taking place in the Americanism that once venerated individualism. Recipient of the B.S. degree from the College of the City of New York in 1922 and the S.B. from M.I.T. in 1924, Mr. Joffe took graduate study at the New School of Social Sciences. As a partner in a firm making food products in Mount Vernon, N.Y., he speaks with the experience of a business executive. Supplementing his business activities, Mr. Joffe, a previous contributor to The Review, has been engaged in studying and promoting educational and civic enterprises in his community.

More Laurels to Win. – The dairy industry may take justifiable pride in the many technological innovations for which it has been responsible, especially during the past half century. Its laurels are not of the past, however, for this basic industry has ample opportunity to make major contributions in providing an adequate food supply for the world's increasing population. Major progress may be expected from increasing the basic yield of milk per cow,

(*Concluded on page 6*)



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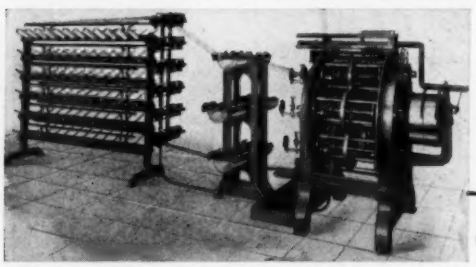

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THE TABULAR VIEW

(Concluded from page 4)

and by utilizing milk and its products more effectively. Such are the views of MILTON E. PARKER, '23, whose entire professional life has been closely associated with dairy and related food industries. His article "Future Technological Developments in the Dairy Industry" (page 22) is the outgrowth of an address delivered before a group of market milk contractors last April at the University of Illinois, and revised for publication in The Review. After receiving the S.B. degree in Industrial Biology from M.I.T. in 1923, Mr. Parker was engaged in a wide variety of research and quality-control projects in the dairy industry, serving for a year as research associate in M.I.T.'s Department of Biology under Samuel C. Prescott, '94 (now Professor of Industrial Biology, Emeritus). In 1928 he became dairy technologist of the Research Laboratories of National Dairy Products Corporation, and, in 1936, manager of production of the Beatrice Foods Company. In 1944 he opened an office in Chicago as consulting food engineer, and in 1948 organized a Department of Food Engineering at the Illinois Institute of Technology, which he now heads.

Promises Unfolding. – At the 25th reunion of the Class of 1928 last June, members of that Class and their guests were privileged to hear PROFESSOR ERWIN H. SCHELL, '12, speak on "The Promise of Tomorrow." The Review is happy to include in this issue (page 25) Professor Schell's address so that its content may extend beyond those who were present in Walker Memorial at reunion time. A continuing personal growth, Professor Schell contends, is achieved when we begin to delegate our activities to others, thus multiplying our energies and accomplishments; when we contribute sheerly for the pleasure of giving; when we develop greater loyalties to others. Professor Schell believes that, by learning the application of these arts of delegation and of greater endeavor one's stature inevitably increases and one's worth is enhanced. Professor Schell is a graduate of M.I.T. and received the S.B. degree in Mechanical Engineering in 1912. A member of the Institute's teaching family since 1917, he is now professor of industrial management, and in charge of the Course in Business and Engineering Administration.

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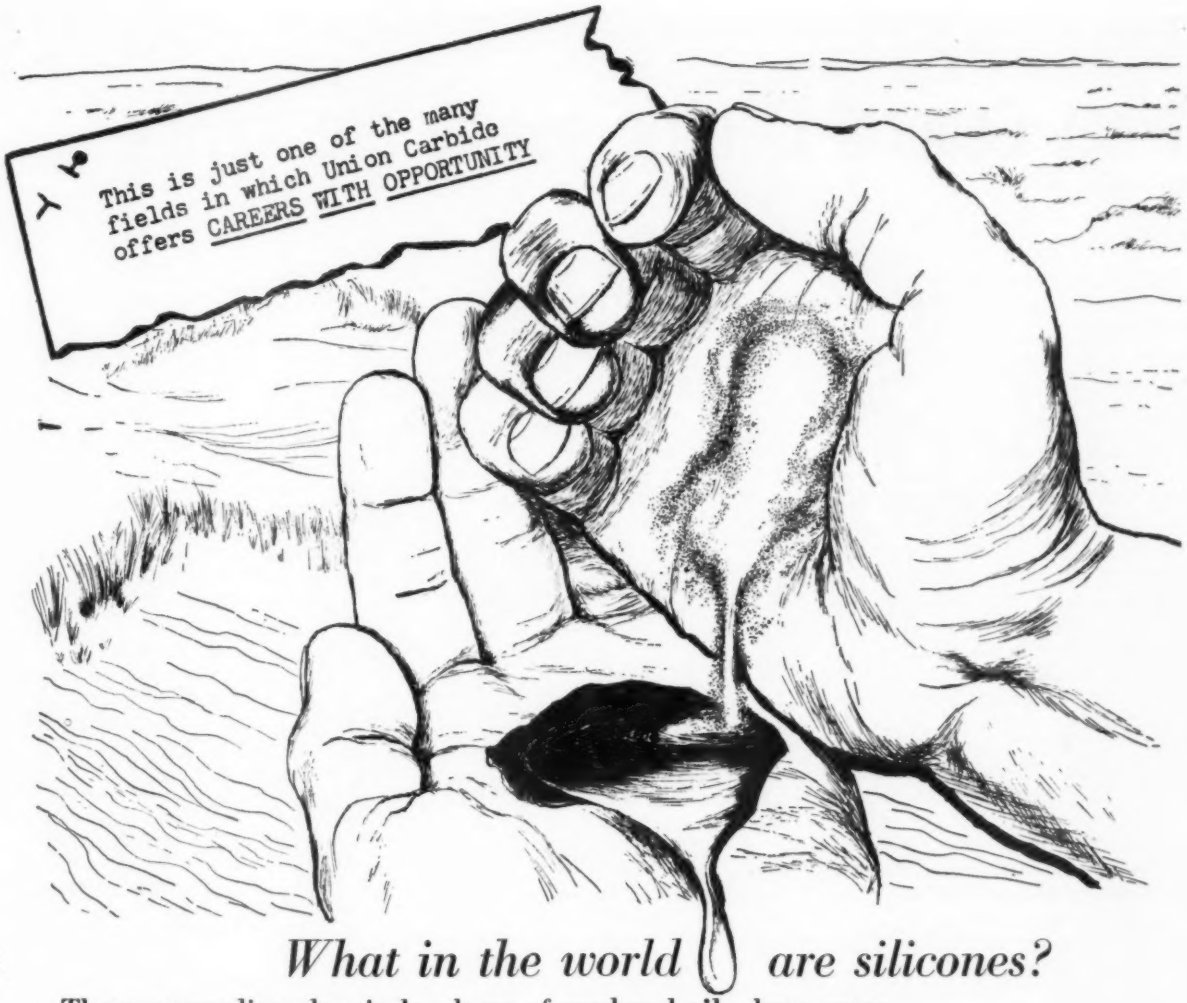

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What General Electric people are saying . . .

L. TONKS

Dr. Tonks is Manager—Physics Section—Knolls Atomic Power Laboratory

For several years we have been operating a reactor which is serving not as a prototype or a direct source of power-reactor performance information but as an auxiliary in such a program—much as a cathode ray tube can be useful in testing television sets. We had experienced the limitations of a Ra-Be source in a graphite pile and foresaw that an experimental thermal reactor could serve as a very valuable tool. Purely as a substitute for the graphite pile, it could easily give us many more neutrons even at low power. Thus, activation experiments either for weighing absorbing foils or fuel itself could be carried out more rapidly. It became reasonable to think that with sufficient intensity and using a chopper we might make actual differential cross-section measurements, and a certain type of exponential experiment in fissionable material became a possibility. Finally, the criticality condition in a reactor makes it suitable for neutron absorption measurements by observing the effect of the material under test on reactivity.

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at the American Physical Society, Rochester, N. Y.

E. J. LAWTON

Mr. Lawton is with X-Ray Research, Electron Physics Research Department, General Electric Research Laboratory

We have recently found that certain polymers, or plastic materials are cross-linked or "cured" when bombarded with high-velocity electrons. This curing process cross-links, or ties together, the long chain-like molecules that make up the plastic material. Some of the properties of this cross-linked material are greater form stability at high temperatures and improved solvent resistance. For example, consider polyethylene bottles or containers (squeeze bottles). These, as you might expect, will collapse if subjected to high temperatures. A short time electron bombardment of such a bottle, however, will change its characteristics so much that it can stand up under steam sterilization. You can start an almost endless list of applications with sterile but unbreakable containers for pharmaceutical and biological materials which require sterilization after packaging. Unbreakable, re-usable milk bottles can be another possible use. Other plastic materials that can be cross-linked by the electron beam are nylon, rubber, and silicone products.

In some of our earlier work we found that certain liquid materials would polymerize to solid plastics when exposed to the electron beam. In this process, there is a joining together of many smaller molecules to form the long chain-like molecules that make up the solid plastic. This means of initiating polymerization does not necessitate the use of catalyst and high temperature that is required in the conventional chemical polymerization process. In fact, we found that polymerization could be initiated at temperatures as low as about 100° Fahrenheit below zero. Further, by controlling the pattern of the electron beam, it was found that specific solid plastic shapes could be produced in the liquid, thus providing a new and interesting way of casting objects.

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C. A. BURKHARD

Dr. Burkhard is a Research Associate at the General Electric Research Laboratory.

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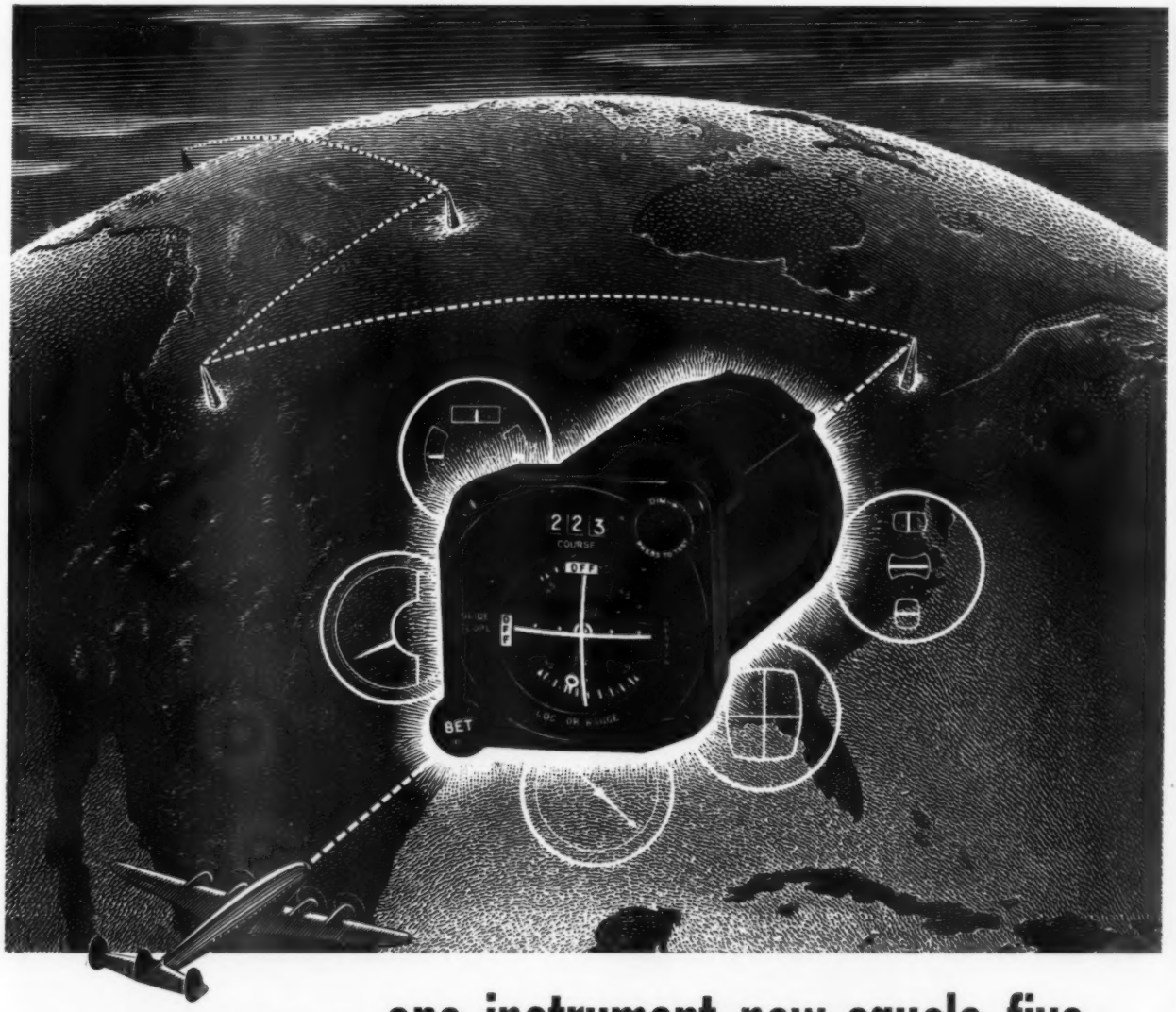

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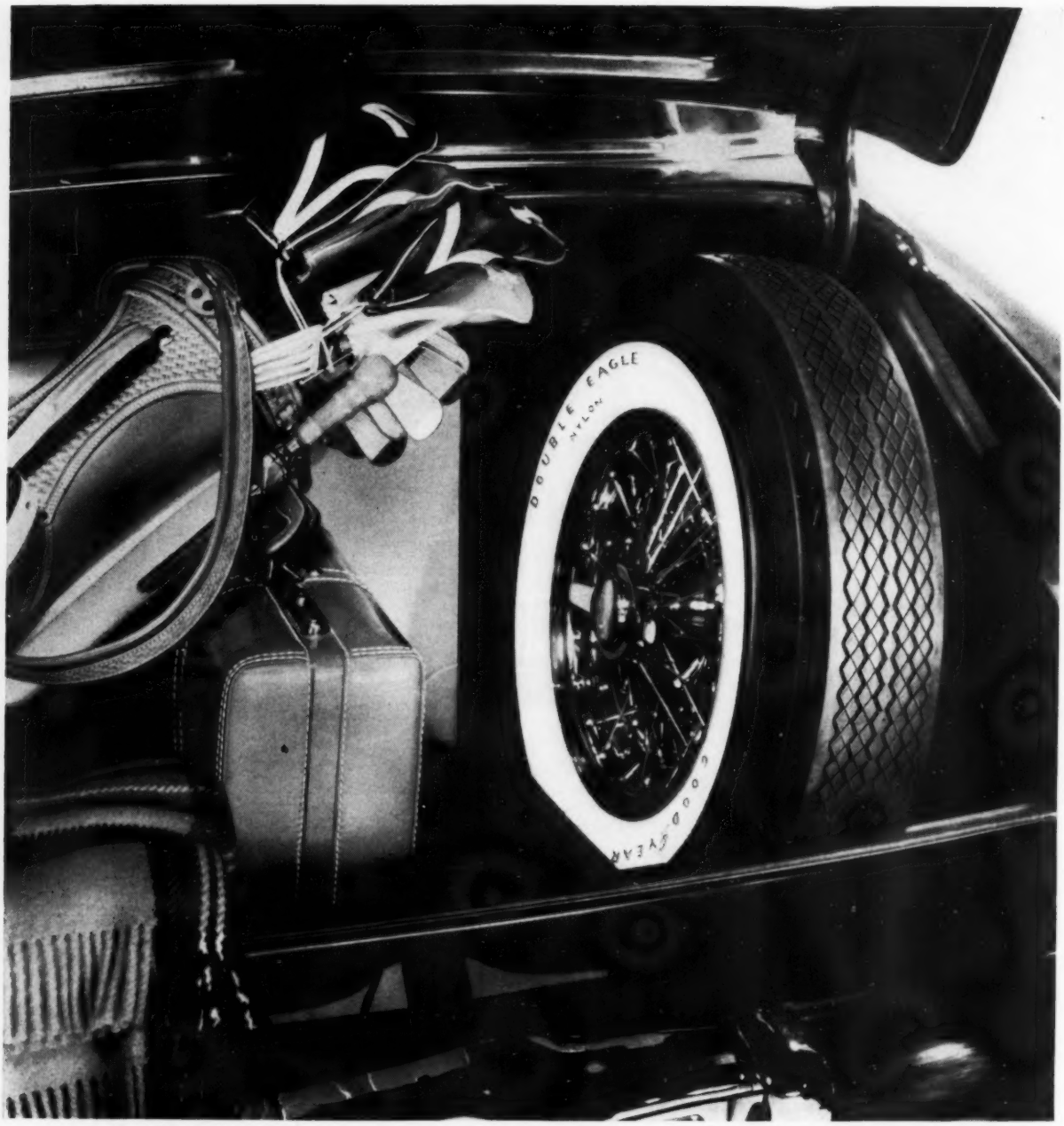

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THE TECHNOLOGY REVIEW

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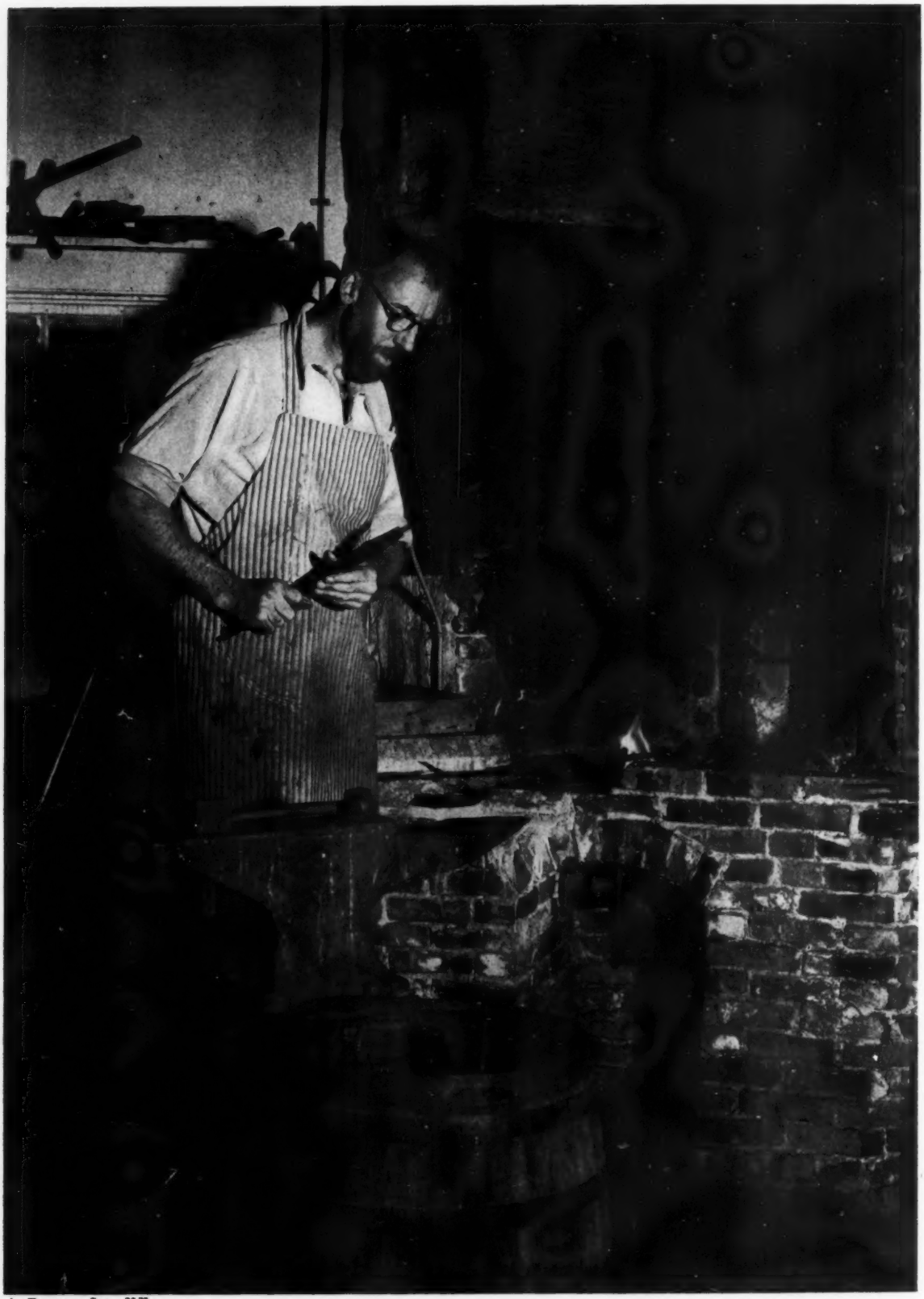

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The Simpler Life

Generations of stonecutters have used the forge in this old shop in Newport, R. I., ever since John Stevens built it in 1705.

THE
TECHNOLOGY
REVIEW

Vol. 56, No. 1 November, 1953

The Trend of Affairs

Nuclear Sideswipe

RESEARCH in the physics laboratories at M.I.T. has produced evidence that an actual collision of nuclear particles is not necessary for a nuclear reaction; the particles can react even though they merely brush past each other. Clark Goodman, '40, Associate Professor of Physics, and Clyde L. McClelland, '52, research assistant, believe that this is the first experimental evidence that nuclear projectiles need not score a bull's-eye to cause nuclear reactions. Their results were announced early in August in the *Physical Review;* the work was supported at M.I.T. by the Office of Naval Research and the Navy Bureau of Ships.

In the M.I.T. studies, hydrogen nuclei – called protons – were accelerated by one to two million volts in a Van de Graaff-type electrostatic generator. These fast-moving protons, passing near, but not striking, the nuclei of any of several heavy elements, caused the heavy materials to give off high-energy x-rays.

According to Professor Goodman, the protons had such low energy that they could never get near enough to do more than wave at the heavy metal nuclei – yet they clearly produced high-energy x-rays (called gamma rays) which were measured and counted by a scintillation spectrometer.

"Putting this reaction on the same scale as our solar system," says Dr. Goodman, "it is as though a large meteorite, about half as big as the moon, whizzed by the earth at a distance of about 30,000 miles. The gravitational effect would create enormous wreckage on the earth's surface, even though our planet were never actually struck. In the same way, the electrical effect of our fast-moving protons may be quite large though they never actually strike the nucleus."

Dr. Goodman emphasizes that the new technique offers no promise as a source of nuclear energy. But it does, he believes, open the door a little wider to the secrets of nuclear structure which nature continues to hide so zealously.

Low-energy reactions are of particular interest in physical research because the amount of energy involved is so low that other nuclear effects are impossible. Thus there are no side-effects, and it is relatively easy to study the reactions.

The work reported during the summer is typical of how new findings may come as fortunate, and unexpected, by-products of scientific activities. In research devoted to studying the reactions of one to two million volt protons with chromium and vanadium, the first hint of the new effect came when unpredicted gamma rays appeared during the experiments. The new effect was promptly investigated. It now turns out that tantalum was, under the conditions involved, the ideal metal to demonstrate the new effect. It has since been studied carefully in both tantalum and platinum, and preliminary work has been done with other materials including silver, tungsten, mercury, and bismuth.

Test at Yucca Flat

As knowledge of nuclear power devices spreads through the world, not always into hands we trust, an experiment performed last spring in Nevada becomes grimly pertinent to every householder. Two typical American houses of wood frame construction were erected by the Federal Civil Defense Administration on Yucca Flat and subjected to an atomic bomb blast. In its explosive force this bomb was equivalent to about 15,000 tons of T.N.T., and is thus somewhat smaller than the bombs exploded over Hiroshima and Nagasaki.

One of the houses was positioned 3,500 feet (a little less than three-quarters of a mile) from ground zero. The front of the house, which faced the detonation, was subjected to an estimated pressure of over 1,000 pounds per square foot, or more than 60 times the horizontal pressure that buildings are normally expected to withstand. Within two and one-third seconds after detonation, the house had collapsed into a pile of rubble. However, manikins in wooden basement shelters were not damaged, and the house did not catch fire. Although the intense heat radiation of the explosion charred the front of the house, and caused considerable smoke to be emitted from the decomposed materials, there was no free flaming. Stress was placed on the fact that the house was painted white, and was thus a rather good reflector.

The second house was located 7,500 feet from ground zero. Although considerably damaged and with every window but one broken, it was habitable after the explosion. Except for the darker areas such as the gray shutters, there was no charring of the surfaces exposed to radiation. The basement was free of debris except for broken glass from the cellar windows, and for doors and shutters blown off their hinges at the rear areaway.

If exposed to an atomic bomb blast of the same intensity as that tested at Yucca Flat, therefore, a building directly exposed at 3,500 feet is virtually sure to collapse, but it will not necessarily burn, if painted white. Objects inside the building and subjected to radiation through the windows might catch fire, however. Strong wooden shelters in the basement could be expected to protect people inside from physical injury.

At 7,500 feet from the blast, a well-built frame house would be damaged, but would still remain a house quite suitable for emergency habitation. The radiation should not set the house afire nor should it char white surfaces. Virtually all glass will shatter, and a serious hazard to exposed personnel may be anticipated from this kind of damage.

Germinal

THE origin of the improbable accusations from behind the Iron Curtain, alleging that the United Nations had waged biological warfare in Korea, has now been revealed; repatriated United States aviators have reported that while under captivity they were forced to make concocted "confessions" of having carried out germ warfare attacks. That the United Nations had engaged in germ warfare had, from the outset, seemed improbable for ethical as well as practical reasons. The creation of disease epidemics that could ravage civilian populations is abhorrent to the enlightened democratic mind. Furthermore, even if germ warfare were essayed, there are many technical obstacles to its effective prosecution.

Thus it is extremely difficult to grow disease germs in the immense quantities that would be required for significant use against an enemy. Furthermore, numerous environmental factors tend to destroy germs once they are exposed outside of the body of a host. For example, in the air, ultraviolet radiations from the sun, desiccation and oxidation are all potent destroyers of microbes. In water – a logical vehicle for biological warfare – no less than eight factors (sedimentation, antibiosis, sunlight, adverse temperatures, scanty food supply, oxidation, osmosis, and bacteriophage) will destroy heavy bacterial contamination, without human intervention, if allowed to act long enough.

But similar theoretical arguments could be – indeed once were – raised against the possibility of an atomic bomb. James A. Tobey, '15, writing in the November, 1952, issue of The Review* has stated: "Biological warfare is . . . definitely not a myth. It is a distinct possibility in the hands of a resourceful and malefic enemy . . ."

Indeed the possibility of a biological warfare attack on this country is real enough that the United States Public Health Service has provided positive measures of defense. A primary phase of such defense is detection of an attack. Since germ war may be conducted clandestinely, prompt detection is no simple matter. Mere appearance of one of the diseases likely to be employed (botulism, plague, typhus, cholera, smallpox, tularemia, brucellosis, anthrax or glanders) does not necessarily indicate activity of germ warfare saboteurs; for at least scattered cases of these infections may ordinarily appear from time to time. To maintain constant vigilance, the United States Public Health Service, through its Communicable Disease Center, has set up an "Epidemic Intelligence Service." This service provides machinery for the central recording, and quick analysis, of data on disease incidence gathered from all over the country. Through this procedure biological warfare activities, even if done clandestinely, would quickly become apparent. Thus detection has been provided for; what about defense?

The logical defense against attacks or sabotage employing biological warfare agents becomes manifest upon reviewing the list given above of the diseases apt to be so employed. All of these infections come within the purview of control measures regularly exercised by governmental departments of health – local, state, and federal. These health department disease control programs are, of course, basically designed not to combat purposely created epidemics, but rather to forestall outbreaks due to inadvertence or ignorance. Nevertheless, the basic machinery for biological warfare defense stands ready in our existing health departments, and needs merely to be endowed with reserve facilities to cope with possible outbreaks of a suddenness or magnitude ordinarily unknown.

This realization, although reassuring, is no basis for complacency. Some areas of the United States do not have local health departments. Public health officials sometimes encounter difficulties in maintaining adequate peacetime programs, because of insufficient appropriations of funds or the vagaries of political administrations.

Here, then, lies the answer to assurance of adequate defense against biological warfare. Our governmental health departments must receive, from the citizenry they serve, the recognition and support necessary to guarantee adequate peacetime activities, with a staff and facilities able to cope with the exigencies and emergencies of a possible biological warfare attack.

* "Biological Warfare – Menace or Myth?" *The Technology Review*, **55**:31-33, 66.

Engineers and Engineering Education

A Plea Is Made for the Evaluation of Engineering Work in Terms of the Effect on Both Our Material As Well As Our Spiritual Standard of Living

By BEN MOREELL

About 10 years ago I was asked by the chancellor of my alma mater to give him a frank appraisal of the engineering course I had taken, in the light of my experience since leaving school. In reply, I stated that I had no major criticism of the technical instruction. I did suggest that perhaps too much time and effort had been spent in teaching engineering practices which were either already outmoded or which had become so shortly after I left school. I suggested that this time and effort might have been more profitably used to inculcate a better understanding of the basic knowledge on which all of the natural sciences are founded. I stated that on the whole, however, I had found the technical instruction adequate.

My major criticism was directed at the lack of instruction in certain vital areas. I mentioned the fact that not only had we received no instruction in the field of "human relations," but we were not even told that this field was one of utmost importance to all engineers.

Having been through the throes of organizing, recruiting, training, equipping, and directing the activities of an engineering force of some 240,000 enlisted men and 10,000 officers, I could speak with some assurance on the importance of learning how to "handle men," or, expressed in more precise terms, learning how to live, work, and play together with a minimum of friction and a maximum of productivity. I believe that my organization, the Navy Seabees, was probably the largest aggregation of technical engineers ever assembled in one working group. Of the more than 10,000 officers, 80 per cent had one or more college degrees, and a number of the enlisted personnel were also engineering graduates. In addition, many of our most capable and outstanding officers were honor graduates of the "University of Hard Knocks."

My second major criticism of my engineering course was that as engineering students we were taught in what might be called a "vacuum." By that I mean that we were given little or no instruction in our relationships to society as a whole and what should be our interest in the social, economic, and political structures of our body politic. More precisely, we were left to wonder about our duties and responsibilities to government and to God.

N.B. This article represents the text of an address delivered by Admiral Moreell before the M.I.T. Club of Western Pennsylvania, in Pittsburgh, on May 25, 1953.

Now I believe that in the light of what has happened to our country and people since the beginning of World War I in 1914, there are no more important things for engineers, or for that matter all men, to know than the answers to these questions:

1. What is the proper function of government?
2. What is our duty to God and to our fellowmen?

It may seem strange to you that an engineer should attach so much importance to two questions which seem so completely unrelated to the practice of engineering. But I believe they are, in fact, of the very essence of engineering, for I am sure that every good engineer, as he plans ahead, has his eye set on the ultimate utility of the thing which he is devising. Unless that thing has a long-range, substantial, positive, and productive value, it is quite likely to be rejected. Such long-range values can be estimated with some degree of accuracy only in the light of probable governmental actions which, in turn, are dependent upon the morality of the citizens, as I shall attempt to show.

Furthermore, I believe the two questions which I have posed are closely related. It is only if we have a clear conception of the function of God or natural law or moral law – or whatever designation you want to use for the supreme and infinite power – that we will be able to achieve a clear concept of the proper function of government. With this knowledge will come an awareness of the great danger to "our lives, our fortunes, and our sacred honor" in which we now stand,

Any engineer who is worth his salt wants to see the product of his labors contribute to the service of mankind.
Underwood and Underwood

if we do not proceed at once to curtail the power of the state which has already eroded our individual liberties to an alarming extent.

Any engineer who is worth his salt wants to see the product of his labors contribute to the service of mankind. I hold further that the domination of the creative mind by bureaucratic control of government will not only deny to mankind the fruits of the sweat of the engineering brow, but will in the end be so repressive as to result in the extinction of the creative species. This would mean the leveling off, *at a low elevation,* of all mankind into a coercive society similar to that of the ants and the bees.

Now you may ask, what is the fundamental function of our government as it was originally conceived? To determine this it would be well to go back to the American Revolution.

The American Revolution was founded on a set of new ideas. The founders believed that each one of us has an inalienable right to life. The right to life must carry with it the right to protect one's life and the right to sustain that life. The sustenance of life requires the control of the fruits of one's labor; that is, one's honestly acquired property. Without these corollary rights, the right to life is a phrase without meaning.

To secure these rights, it was agreed that the people would appoint an agent whose duty would be to do for all of them collectively but equally that which they had a right to do for themselves individually. This agent, called "government," was commissioned to defend the lives and livelihoods of the nation's citizens; to invoke a common justice; and to keep the records incidental thereto. Other than this the people were to be left free to pursue their own interests, whatever those interests might be.

Ewing Galloway, N.Y.
We must appraise the values of engineering works in terms of their effects on both our material and our spiritual standards of living.

What was so revolutionary about those ideas? It was this: Never before in history had any people succeeded in establishing themselves as completely sovereign. Never before in history had any people succeeded completely in relegating the political agency of force, that is government, to the position of a servant. Never before had the idea been put into practice that the fruits of one's labor are one's own to keep, to trade, or even to give away if he so chooses. Always before in history it was the agency of force – government – that was sovereign. Any right to one's product, even to one's life, was a right granted to the people by the agency of force, that is, by government. But the original American ideas, when put into practice, limited strictly the agency of force and thus released the creative and productive energies of the millions who constituted America's citizens.

This brings up the question: Have we adhered to those basic principles upon which there was erected an economic and social structure which provides for the individual citizen a larger measure of spiritual and material welfare than ever before in the history of the world? I am sure that you know the answer to that question. For the growth of governmental power in this country has been so great and so rapid that the answer is quite obvious. By misusing the "general welfare" and "commerce" clauses of our Constitution, by unwise constitutional amendments which nullify the intent of the founders, by judicial decisions influenced by political expedients, and by abdication by the Congress of its power in favor of the Executive, the advocates of an all-powerful centralized state have succeeded in erecting a top-heavy structure of controls, regimentation, subsidies, and punitive taxation. These have impaired the liberty of the individual to an extent such that many true liberals now believe that the cause for which the American Revolution was fought has already been lost.

The centralization of power in the hands of the executive branch of the federal government by subversion of the legislative and judicial branches has gravely impaired that system of checks and balances which the founding fathers erected with such great care and devout faith as the guardian of our individual liberty. Today the state's power penetrates every nook and cranny of our social and economic structures.

The founding fathers looked upon government as primarily a preventive mechanism; that is, a mechanism designed to prevent interference with the liberties of the individual by any other individual or group. It seems that we have rejected this concept. We have drifted into the easy habit of looking upon government as an instrument of positive action to provide for all – not only security, but also ease and comfort.

We appear to accept without protest the thesis that government should have the duty to deprive certain citizens of the fruits of their labors in order to benefit others who cannot or will not provide for their own needs. This, we say, can be done only by conferring absolute power on government so that citizens are forced to yield when their earnings are taken from

(*Continued on page 40*)

An Appraisal of
SUBURBAN MIDDLE CLASS LIFE

What Happens to Society When Moral and Parental Influences Wane? When Leveling Forces Operate? When Taxes Remove Incentive? Such Are the Questions Asked

By JULIAN A. JOFFE

It is generally accepted that our society is divided into three strata which meld gradually from the lowest through the middle to the upper. Although the lowest of the low is far removed economically from the highest of the upper class, yet the innumerable steps in between are often imperceptible. For convenience, students of the social sciences recognize the three main divisions and then further subdivide each class into three smaller categories. In this manner, our society is broken down into a total of nine groupings. Each class has within itself its own low, middle, and upper subdivisions.

The Greek philosophers long ago observed that, to be healthy, a society must include a happy and strong middle class, to serve as a buffer between the two other classes at its extremes. It serves as the societal balance wheel that counteracts the potential oppressiveness of the upper class and tempers the unrequited desires of the lower class. The middle class offers a competitive threat to the upper and a hope to the lower.

It is a Marxian theory that the greed of the upper class is so voracious and so insatiable that, given sufficient time, its members will ultimately grind the middle class to the level of the lower class, at which time the social distance between the two extremes will become so great that the society will collapse. This theory presupposes a societal life with neither compromise nor accommodation. There is but one devastating conclusion for the Marxist: the operation of an inexorable fate grinding all society into a single proletarian whole. Capitalistic peoples deny the validity of such Marxian presumptions and none is prepared to accept them.

Since a sound middle class is the backbone of its nation, it might be fruitful to investigate some aspects of its life in our society. That portion being examined in this article lives in the suburbs, in close proximity to a big city. Generally, its male members commute via train or automobile, leaving in the early morning and returning in time for dinner. For the sake of the discussion the members of the lower middle class shall be omitted from consideration. Life among the middle-middle and upper-middle classes shall be investigated.

The suburbanites have at their disposal the opportunity to live life to the full within the cultural milieu of our societally accepted norms and standards. They possess the wealth and the leisure to take advantage of all the external circumstances to enjoy their lives fruitfully, comfortably, and interestingly. Should they desire, they might participate in or create cultural environments that could further enhance their spiritual and physical well-being. Of all of our people, the middle class should be well adjusted spiritually for that is the group upon whom the benefits of the American way of life with its concepts of work, hope, and reward have operated most kindly. Its members have been fortunate to have struggled and to have attained their goals in this life. The multitude regards them with great envy for the middle class epitomizes their own dreams and aspirations. Not the least of the great rewards that the lower class envisions, as one of the benefits of middle-class living, is the sense of security that membership apparently includes.

The members of the middle class have met with varying amounts of economic success, some even be-

H. Armstrong Roberts

The full measure of the advantages that the suburbs offer is enjoyed only by the wealthier levels of the middle class. It is very expensive to live a suburban life to the full.

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Harold M. Lambert

These activities continue all afternoon and generally degenerate into card parties. . . . In season, there are the races at the tracks.

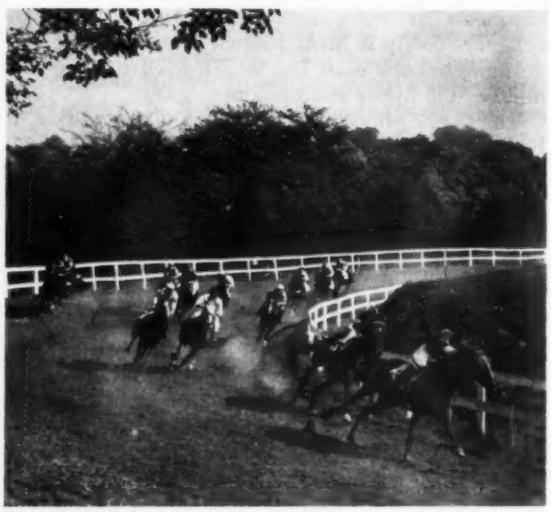
The women of this cross section of our country uniformly employ domestics to save themselves the drudgery of housework. Many find that a solitary domestic is inadequate, mainly because these workers have been strongly and naturally influenced by the laziness and lethargy of their employers. There are innumerable chores about the home that the domestics categorically refuse to attend to. However, in the rare instance where the mistress co-operates, it is indeed astonishing how the houseworker increases her efforts and accomplishments. If Mrs. Suburbs declines to accept the responsibility of work in her own home, her domestic becomes a mere dishwasher and bed maker. In such an eventuality, even though a washing machine may be part of the equipment of the ménage, a laundress is employed, unless the bulk of the soiled materials is sent to the laundry. The permanent employee will rarely wash windows or clean walls. For such so-called heavy work, men with established clientele have their set routes, going from house to house. An especially capable individual is highly sought after. A woman who is blessed with such a man with strong back and willing arms will go to any length to retain him. He is showered with gifts, meals, and even is bailed out when – or if – he comes to grips with the law.

Both man and wife are responsible for a situation in the labor market that renders it difficult for those less affluent to hire competent help when they, too, might need it. Some suburbanites spend sums on gardeners and other day laborers far beyond their economic value and worth, accepting ridiculous rates for little reason other than that they can afford it. Work on lawns often is so shamefully expensive that a reasonable individual is aghast at man's cupidity. Many thousands of dollars are squandered upon insignificantly small plots of ground, or tens of thousands upon larger ones so as to enclose the home within an expensive green frame. Trees are felled to develop lush, soft green carpets upon which no child dare romp, set foot, or play.

ing very rich. Those at the lower end of their category have not attained the necessary affluence for the leisure that is so characteristic a phenomenon of the more fortunate members of their class. This leisure becomes first apparent in the middle of the middle class. The lower groupings have to work and strive to make every available dollar rend its greatest return. Since it is in the home that the bulk of the expenses occurs, it falls upon the woman to carry the brunt of the burden of her class. She "slaves," works, or kills time – dependent to a great extent upon her position in society and the affluence of her husband.

Within the last generation there has occurred a marked mass exodus of the middle class to the suburbs. It has been said about New York, for instance, that in a short time, only the very poor and the very rich will remain, unless the government ceases its endless projects, inviting an endless stream of substandard residents the further to depress additional areas. Many move out of their own big city to the suburbs, because of the attraction of play areas, smaller school classroom enrollments, social clubs, and all the other attributes that make for gracious living. The full measure of the advantages that the suburbs offer is taken to wholeheartedly most completely only by the two upper levels of the middle class, since they have the inclination as well as the wherewithal. It is very expensive to live a suburban life to the full!

The middle class has fought its way, competitively, to gain its coveted position. However, its membership, by far and large, is neither sufficiently nor inherently wealthy to feel secure in its attained rank. The insecurity of the middle class is pitiful, for its tender hooks upon riches are not wrought with inherited gold bands. Its hold is fragile, dependent upon a successful profession, an excellent position, a profitable business – all of which, for any number of reasons, may disintegrate with precipitous suddenness. Moderately wealthy suburbanites can see the pinnacle above with the chosen few, as well as the dark and forbidding crevasse stretching to an unfathomable depth below with its depressing masses.



H. Armstrong Roberts

Like the exterior surroundings, the interior of the home also is carpeted expensively. It is indeed remarkable that with a high degree of uniformity the floor covering is of a thick nap, as is to be expected, but in addition it is almost always of a very light hue. Naturally, such pale shades show soiling more quickly. This is a desirable feature as it indicates that the host and hostess can afford servants to keep it clean! In addition, those who are cognizant recognize that the downstairs area so carpeted is never permitted to be used by the children, lest they stain mother's rugs. Not only are the carpets cared for as a sacred possession but the chairs are too valuable to be sat upon every day. Often they are covered to protect them for guests. Thus we find that the family, in spite of superb furnishings, eats in the kitchen or breakfast alcove. Guests, of course, are regaled where the wealth can be displayed. Everything is for them to see but not for the family to use. The suburban house is no home in the poetic sense, but a storage building for prize possessions. Ostentation is an accompaniment of pretension.

In former times, when a girl married, she became a housewife and eventually a mother. Today, the radio has chosen to glorify our women as homemakers. When the wealthy, middle-class woman moves into the suburbs, she employs an interior decorator to furnish the home and virtually to choose everything – wallpaper, rugs, chairs, light fixtures, pictures, fabrics, bath tubs, showers – everything that in the ordinary sense goes into a home as a prerogative of its ownership. She hires experts to plant her grass seed, to lay out the garden, and to buy the garden furnishings. True, our suburban woman can (if she wishes) be a mother, but she is no longer a housewife nor is she a homemaker.

Some of the women will drive their husbands to the suburban trains, only to return to bed after that chore. Often their days never start before 10:00 A.M. There are the rare exceptions who even suffer to have breakfast with their husbands. What they eat at that meal or at others is not of itself consequential, if it were not for the fact that the majority, because of their lazy existences, overeat and overindulge. Suburban women are endlessly talking of reducing. They make a fetish of food fads, and such topics are a common course of conversation.

To obliterate the ugly effects of a high caloric intake, our suburban men and women frequent institutions which cater to that aspect of their lives. Regularly both sides attend gymnasiums for suitable massages and reducing exercises. For two or more weeks at a time the women migrate to stagnate at "milk farms" where, under a police-state like supervision, they are starved for an adequate remuneration. This is a thriving business.

The matter of television brings up another interesting observation about the suburbs. Its residents have taken to this latest boon to American industry with enthusiasm. If a house has one set it can afford two or three, in the upper categories. Many have them in the rumpus room (a combination private saloon and children's play pen) or in the living room, den, or card room, as well as in one or more bedrooms. In this manner, no matter where one might be in the house,

H. Armstrong Roberts

Thus they go their merry ways. One may prefer deep-sea fishing while the other enjoys the mountains.

there is always available nearby a plethora of entertainment.

With an expanding population and an ever-growing technological development, the tools and knowledge of industry are employed to create greater liberty for all from the bondage of work. Immigrants and those poorer native born, who yet have the uncorrupted drive and intelligence, realize that self-improvement and education are the leading ladders for hierarchical advancement up the social pyramid, and use their new found time for study and cultural advancement. Unfortunately, our suburbanites, by far and large, have "arrived," and many of them bemoan their fatigue after the long and arduous economic journey. Their time and wealth are squandered upon expensive gadgets and mass-communication methods of relaxation, awaiting as it were, in a comatose state, their own inevitable demise. They seem suspended amid an aura of perfumed luxury, their senses dulled, devoid of critical evaluation, indulging endlessly in stereotyped conversation. It is difficult to decide among the New Deal, television, and radio as to which

Or one may be enticed by the excitement that Cuba offers while the other may prefer the soothing baths of one of our best known spas. The boredom and ennui that characterizes so much of our suburban life is reflected in the need for running away for vacations.

Harold M. Lambert

has been the greatest equalizing force in the American way of life. However, there can be no question as to which are the intellectual levelers.

If she does her own purchasing, the suburban woman shops via the telephone. Some years ago the author had occasion to observe the mechanism (within a series of very high-class markets) whereby this service operates. It was indeed revealing, for it gave an insight into what is a highly insulting and degrading practice. The various markets that cater to suburban telephone shoppers are at a distance from their clients. Therefore, they have little fear from comparative shopping. If it should ever come to pass that a price were questioned, the stock reply is that the quality of the specific item is "indeed superior." The only economic justification for the existence of such high-class, suburban markets is that they cater to women who do not care to be concerned about their food budgets.

Women's clothes are a problem to all men, except that in the instance of suburbs, more of it is sewed privately by fashionable dressmakers. Certainly a good deal of it is either "taken in" or "let out" by these women, as the ravages of appetite take their tolls. Most of the exclusive shops never run sales because of the effect on their customers' morale. Instead, they sell their postseason garments to cut-rate or auction stores far removed from their fashionable neighborhoods. The choice garments may then be bought for a fraction of the original price. For a slightly higher price the clothes may appear under new labels in mass locations. The women of the lower-middle class spend many afternoons a week hunting for these left-over bargains.

An amusing foible of this social group is the importance attached to personal appearance. The hairdressers, manicurists, and masseuses travel from home to home with their skill and their gossip. The ritual consumes hours and is enjoyed by all. It is repeated during the week as often as vanity demands and the purse permits.

The less affluent patron frequents beauty parlors in town. The hysterics and pandemonium that rage in the house lest the woman be late for her appointment at the hairdressers' should bespeak a more worthy endeavor and undertaking.

If Mrs. Suburbs be through for the moment with her apparel and facial problems, she has free time for a luncheon, tea, or the club. These activities continue all afternoon and generally degenerate into card parties. In season, there are the races at the track. That she may lose a little money at each is inconsequential, but when she wins, the occasion is memorable and important. Whenever possible, she endeavors to have her afternoon nap. It is no wonder these women outlive their husbands!

Suburban women do not have the superfluous wealth to really do things, but remain on the side lines jealously watching the upper-class rich. They may belong, or lend their names, to worth-while endeavors but rarely are they workers in the true sense of the word. Instead, as a group, they complain about anything and everything. Their lives are so barren of interest and purpose that they become introspective, and endlessly frequent doctors for cures for diverse symptoms. To listen to them discuss their ailments would be ludicrous if it were not so sad. A frequently heard admonition by Mr. Suburbs, "Honey, you must relax," causes one to wonder from what.

Earlier in this article it was mentioned that those within the higher brackets of the middle class suffer from fears of economic insecurity – the women more so than the men. The latter are accustomed to work, and if need be, turn on more pressure. Should the income be curtailed, or there be signs that it might be reduced, it would be the woman who would have to economize. This would necessitate more judicious shopping, a decreased allowance for clothes, and/or a greater share of household chores to fall directly upon her! Such changes border upon the catastrophic and are terrible to contemplate. Every conceivable subterfuge is concocted to forestall such an eventuality. Thus, a dress is bought to buoy up the spirits. The explanation usually runs along the lines of: "It did something for me." The customary hairdo and facial are explained away by: "I needed them. I was so worried looking. You would not want our friends to know about us, would you, dear? Fire the help?"

If the household help is curtailed, it remains so for a very short period. It is not so much that the food might be inferior, or that the beds might not be made, or the living room left unswept, but rather that the master finds that his spouse has become a nervous wreck. She cannot "take it!" Reverses come hard!

Harold M. Lambert

Mr. and Mrs. Suburbs entertain prodigiously, and in turn, receive reciprocal invitations. But for all their parties, dinners, and dates they enjoy few friends.

And so it appears that the life of the suburban woman tends toward the parasitic. She is neither a helpmate nor a housewife. As a rule, when she and her family settle in their home, all the children that are to be have been born to the couple. Her interests being so dominantly egocentric she has ample opportunity for self-pity and worry, and indulges in a mild form of satisfying hypochondria. Her illnesses, pains, and aches receive sympathetic attention from physicians and friends. Such innermost problems always become interesting conversation pieces when suburbanites gather. Difficulties that less affluent women learn to expect, through the hardships and vicissitudes of life, become insurmountable burdens for many suburban women. Suburban women live from one crisis to another.

In the instance of suburban women, it may be said pointedly, that "all that glitters is not gold." For all their apparent comforts their lives are not as enviable as might be expected. Their interests are woefully narrow and their existences dull. However, it must be noted that it would be the rare exception who conforms in every particular to the characteristics described in the body of the article. Although the ideal type would be extremely unusual, the majority of suburban women within the two upper divisions of the middle class would be found conforming with most of the observations for their groups.

The characteristics displayed by suburban women are but the reflection of the uncertain lives led by their spouses. The latter are torn between two forces. They strive to beget wealth, to amass tangible evidence of fickle security and to escape from the resultant nerve-racking, grinding effect upon their own lives.

Years ago, the drive to work and to attain position and wealth had a distinct philosophical and religious connotation. This has been analyzed best and portrayed by Max Weber in his renowned volume *The Protestant Ethic and the Spirit of Capitalism.** Herein we discover that because of the religious sentiment and belief surrounding predestination and salvation the early Puritans and Calvinists had a "call" to work. Their striving for acquisition stemmed from a sincere spiritual force.

The suburbanite accumulates for he knows not what reason. He has no "call": his is a drive, a maddening desire to get more – more of anything and everything – from which he likes to run away, to escape, as often as possible, to be with others like himself who also have become depressed over the abject helplessness of their conditions. Endlessly they ask of each other, "Why?, oh why do we do these things? The rewards are not worth the effort nor the waste of our lives. We become wornout old men before our time, and anyway, we cannot take it with us."

Veblen, many years ago, observed how acquired wealth can be squandered needlessly. The suburbanite exactly fills his concept of life devoted to "conspicuous consumption." The Puritan or the Quaker never surrounded himself with tinsel or gilt. His religion forbade him. No such moral scruples surround the suburbanite. He glories in expensive china, rarely used because it is so fragile. He adorns his walls with the paintings of neurotic artists. He and his wife will buy useless trinkets in Mexico, or Brazil, or Cuba while on a cruise so that their friends and neighbors may always have tangible evidence that he and his have money to burn, time to waste, and are proud of it. Ostentation has become an American "good" of the middle class.

Underwood and Underwood

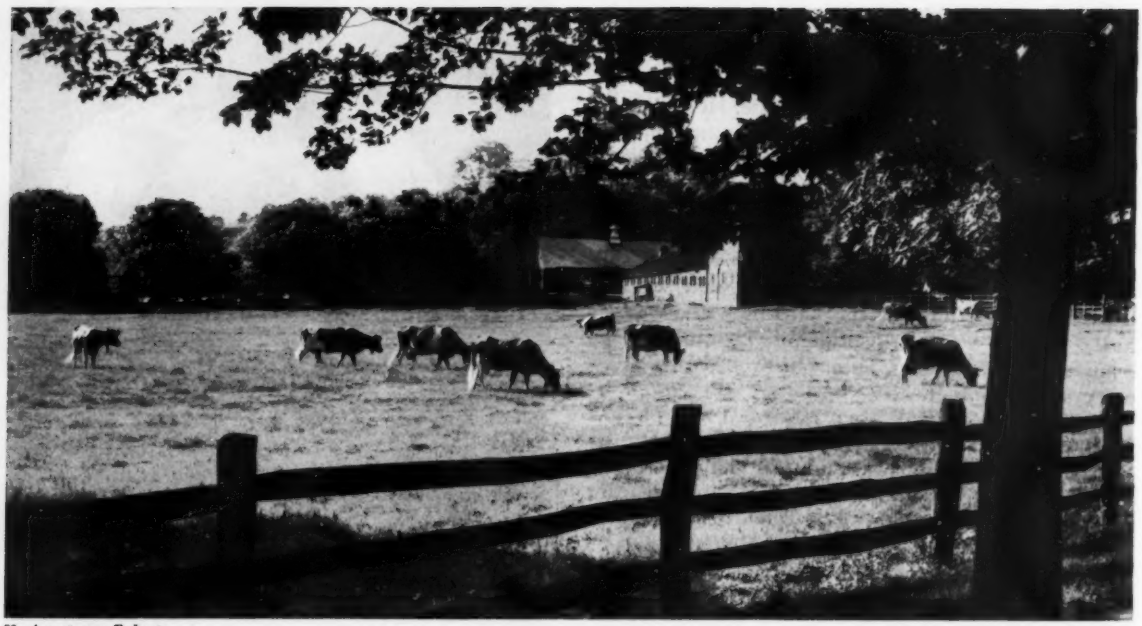
Wealth is confiscated through taxation. Acquisition is discouraged and incentive for further gain, ethically achieved, is considerably diminished. On the one hand wealth is taken away; and on the other it is distributed to farmers to curtail production. . . . Incentive is becoming a marginal utility.

Vacations, as enjoyed by suburbanites, form somewhat different patterns from those of other groups. The most obvious characteristics are that they occur with relative frequency and extend overly long. In the lower portions of our economic life, entire families enjoy together a week, or possibly two, of freedom from work. Rarely do husbands and wives separate for their yearly rests. Suburban men and their wives do not necessarily vacation together. It is not uncommon for the suburban women to dislike (and to be able to afford to dislike) places their husbands prefer to enjoy on their vacations. Thus, they go their merry ways, and at odd times. One may prefer deep-sea fishing while the other enjoys the mountains; or one may be enticed by the excitement that Cuba offers while the other may prefer the soothing baths of one of our best known spas. The boredom and ennui that characterize so much of our suburban life is reflected in the need for running away for vacations. These "changes," recommended by well-paid doctors, occur in direct proportion to the degree of marital maladjustment, economic insecurity (upon a wealthy level), and general dissatisfaction with life. A minimum of two such breaks a year are a must: usually there are more.

Within the suburban environment, the children are the greatest sufferers. Since the lives of the parents are basically insecure and unsatisfying, they cannot but reflect this uncertainty upon their children. A

(*Continued on page* 44)

* Translated by Talcott Parsons (New York: Charles Scribner's and Sons. 1930).



H. Armstrong Roberts

FUTURE TECHNOLOGICAL DEVELOPMENTS IN

The Dairy Industry

Major Contribution in Providing Adequate Food Supply Can Be Made by Increasing Basic Milk Yield Per Cow and Utilizing Milk and Its Products More Efficiently

By MILTON E. PARKER

THE dairy industry, one of the major food-processing industries, can point with justifiable pride to its own technological progress and also to the fact that such progress has made significant contributions to the progress of its industrial contemporaries in the food field. However, the dairy industry forms but part of the nation's food basket. The food field is a tremendous, fast-moving, highly competitive group of industries ceaselessly inventing new and better ways to produce, prepare, process, handle, and distribute its gigantic annual output of nearly 60 billions of dollars' worth of food. Truly, food processing constitutes the Goliath of all our national processing industries.

The public health movement in the United States, aided and abetted by the scientific acumen and technological foresight of Professors William T. Sedgwick, Edwin O. Jordan, '88, Samuel C. Prescott, '94, Charles-Edward A. Winslow, '98, and others, has made its imprint on the quality of foods being processed and distributed today. In its inception, that movement was motivated by the necessity of providing safety, so dramatically demonstrated in the researches of M.I.T. men in water purification, milk sanitation, and commercial canning. The early pioneering efforts succeeded in the virtual elimination of the infections and diseases that delayed the public's early acceptance of commercially processed foods. Inasmuch as bacteria of various and sundry descriptions, both pathogenic and harmless, found milk their most nearly perfect vehicle for the dissemination of disease and food spoilage – just as the human family also found it the "most nearly perfect food" for its own nutrition – it was only logical that the conquest of these enemies of public health and quality had to be realized.

Such a campaign was furthered by the discoveries of pasteurization and mechanical refrigeration; the latter, incidentally, originally fostered the commercial development of the dairy industry as well as of meat packing. Consequently, it is not surprising that in solving its technological problems with the delicate, basic food it was concerned with, the dairy industry found solutions that were applicable to other foods as well. Some of the major contributions to the present-day practices in the manufacture of other commercially processed foods will be outlined subsequently.

In the ensuing years since the advent of the Twentieth Century – and as the scientific and technological frontiers of public health were being penetrated and advanced by some of the graduates of the

Department of Biology and Public Health of M.I.T. – the dairy industry has enjoyed its role of industrial pre-eminence as it gloried in the aura of being the purveyors of nature's "most nearly perfect food." That distinction led many of its leaders into thinking that no other food could ever threaten the supremacy of the products of milk. In fact, in 1923 the dairy industry prevailed upon the Congress of the United States to pass an act defining butter – the first and only time such congressional action was ever taken in behalf of a single food commodity. Meanwhile, as the ravages of disease were conquered with the advancement of pasteurization, it became obvious, after repeated warnings from the consuming public, that the flavor of milk was being impaired perceptibly. Coincident with the confidence in the public health safety of pasteurized milk supplies, however, the commercial canning of foods advanced with the improvements in its industrial processing made possible by the introduction of the steam-pressure retort.

It was also discovered that metallic contaminations affected the flavor of some processed foods, including milk; and that the thermal-processing techniques used in pasteurization and pressure retorting imparted cooked tastes which detracted from the natural flavor characteristics of good quality foods, including milk.

As these advances were being made, the profession of food technology, which found its major champion in Professor Prescott (the original President of the Institute of Food Technologists), became active on many technological fronts with discoveries that thermal processing could, in truth, impair the flavor of foods and could also adversely affect their nutritional values. These discoveries led to improvements among a great variety of foods.

With its understandable attitude concerning the natural excellence of its own products, the dairy industry aggressively opposed the public acceptance of competitive foods. In earlier years the dairy industry was concerned about fraudulent claims for some competitive products, but these were later improved and did have a definite economic appeal to certain segments of the population. The shrewdness of certain industrial leaders in competitive food industries capitalized on a blind resistance to progress in some quarters of the dairy industry. Although history had repeatedly demonstrated that consumption curves were obviously influenced by prices – butter consumption rising as its prices fell and vice versa – a rude awakening came when our national consumption of margarine approached and then exceeded that of butter. And to add emphasis to this economic corollary, sudden competition has developed from frozen desserts whose fat components are of vegetable origin. These desserts can threaten the future security of the ice cream industry as that of the butter industry was threatened before the onset of World War II. There are, however, definite hopeful signs that the leaders of the dairy industry are not going to be blind to this latest threat, for many of them are now catering to the public's tastes and pocketbooks rather than opposing its preferences.

The stresses and strains to the economic future of the dairy industry will require adjustments in production, in processing, in products, and in distributon. Strange as it may seem, the aggressive competition that the dairy industry is facing today has been made possible by some of its own major technological developments. However, most of it has been contributed by the improvements and discoveries of food technologists in other fields. The solution of the problems will inevitably be found in economics, by making milk less expensive and more plentiful. It is no heresy to advocate greater milk production; as a nation we do not consume nearly as much as we should even though we presently have an acute surplus. Nevertheless, the burden of solving the problems of the dairy industry will rest heavily on the shoulders of special kinds of food technologists, for there will be an ever increasing emphasis on those trained specifically in the engineering aspects of food processing.* Any food industry is apt to find a specific kind of technologist, such as a dairy technologist for example, too great a luxury. Competition in foods is going to demand breadth of knowledge in the fundamentals of production, preparation, processing, handling, and packaging techniques. The dairy technologist, therefore, is apt to find himself too limited in vision unless he broadens his basic knowledge to exploit the unusual technological resources of the dairy industry to their fullest. That is, the technologist is going to require the ability to deal with fundamentals of nutrition, as well as the scientific and engineering fundamentals employed in the processing of all foods.

Before we prognosticate future technological developments in the dairy industry, we should review briefly some of the more important ones of the past. We might start with the fact that while starting a vogue in unit food packaging as well as trademark advertising at the turn of the Twentieth Century, Uneeda Biscuit also stimulated the paper industry of New England by creating a demand for its products in the distribution of foods. Then, too, in taking crackers out of the barrel and packing them in a chipboard container with a waxed paper liner and a printed paper overwrap, Uneeda also stimulated the former Continental Creamery of Topeka, Kansas, to undertake the merchandising of their Meadow Gold brand of butter in similar packages. Simultaneously, packaging experiments of Emerich H. Vavra at the Spring Brook Creamery, in Elgin, Ill., then the butter capital of the world, had two important effects. It led the Standard Oil Company and its competitors into the development of the microcrystalline waxes of today; more immediately, however, it laid the foundation of the so-called wet-waxed folding carton in which we buy our butter, or our margarine, when we pick up our favorite brand at any store. This style of package also led to the wet-waxed wrappers used today in merchandising the sliced bread we also buy at grocery stores. So, granting the author a bit of poetic license, we might say that the bread and butter business started our modern developments in unit food packaging!

We also hear a lot of discussion these days about taste panels to which newly developed foods are presented for prior appraisals before somebody speculates a million dollars to put a new food product on

* Charles W. Kaufman, "Progress in the Food Industry," *Food Processing*, June, 1953.

the national market. We say "speculates" advisedly, for the taste panels make the market introduction of a new food product a calculated risk, which otherwise would be an out-and-out gamble. But when we look back into history, we find that in a number of the World's Fairs following the Columbian Exposition, trained taste panels were selecting the winners of gold medals awarded for the quality excellence of products. And that is not all, for such beginnings soon led to commercial scoring methods for appraising marketing qualities as well as the commercial values, or prices, of butter – and later on for numerous other food products, too.

A prevailing and exciting interest in canning circles today centers around discussions of aseptic canning, end-over-end thermal processing and continuous agitating cookers. All such developments use knowledge gained in the dairy industry's earlier experiences with high-temperature, short-time techniques of milk pasteurization with its attendant advantages of superior flavor, yet with the retention of adequate health safety qualities. Then too, that phenomenal food processing industry of such amazing and rapid growth – the so-called "baby food packers" – were guided in their disintegrating or comminuting of spinach and other vegetables by the earlier experiences of the ice cream industry, and later the market milk industry, with the homogenizer. In passing, we might point out an anomaly – the baby foods have their greatest consumption among old persons and invalids!

These are but a few of the milestones established by the dairy industry which have guided other food industries in realizing their own substantial technological advancements and achievements. Neither time nor space permit an exhaustive recounting of all the improvements in food processing attributable to the technological advances of the dairy industry. But in passing, let us not overlook the importance of the sanitary design of dairy processing equipment made of gleaming stainless steel and similar alloys, nor the sound sanitary design standards which are followed in the construction of other food handling machines (of recognized value to all food industries) in the furtherance of their own sanitary processing practices.

Harold M. Lambert

It is no heresy to advocate greater milk production; as a nation we do not consume nearly as much as we should even though we presently have an acute surplus.

While the dairy industry can "point to the past with pride and the future with confidence" because of the technological developments it has thus fostered, it can ill afford to do so with any complacency. For with the present rate of technological developments, plus the growing pressure of population upon our food production, the industry needs to be alert and ever more progressive if it is to retain its technological leadership.

Then too, in addition to their own internal competition, all food industries are constantly pitted against competition of every other industry interested in selling food and allied products. It has become axiomatic that, to progress, a close check must be kept on the activities of competitors as well as all developments pertaining to products, processes, and equipment. Also, consumer preferences and economic influences cannot be ignored. There is nothing static about any food-processing industry. We see radical changes in markets taking place almost overnight as consumers are weaned away from conventional food products to those possessing unusual appeal, economy, or convenience in the estimate of the buying public.

One great factor to be kept foremost in mind is that the tempo of development is gathering more and more speed. Life literally is changing under our very eyes. Today we have things we did not have yesterday. And what is more important, the rapidity of the change is accelerating at a bewildering rate.

There was a time when developments depended solely upon new things happening by accident. The curiosity of Benjamin Franklin, for example, led to his playing with electricity for the amusement of his friends. A little later we see the advent of the systematic seekers after scientific knowledge, Faraday being among the earliest. Edison was one of the first to organize research groups on a commercial basis. Today we have literally hundreds, if not thousands, of research groups in industry and universities. Constantly, we hear of new organizations of professionals who are brought together by the pressure of events for the purpose of sharing, discussing, and solving mutual problems.

The impulses of any organized efforts serve to activate the impulses of other organized efforts. Translated into more practical terms, this means that competition among individual companies of any given industry is not only accelerated but, in addition, self-preservation is forcing competition to develop between different industries. When we attempt to resolve our discussion in terms of food products, it immediately becomes apparent that competitive forces will be intensified if only by the fact that a human being does have physical limits to his food intake (the per capita consumption of food hovers around five pounds

(Continued on page 52)

The Promise of Tomorrow

Address to the Class of 1928 Emphasizes that Continuing Personal Growth Is the Great Promise Which the Future Holds for Those in the "Afternoon of Life"

By ERWIN H. SCHELL

THE current convention in good teaching now lists heavily toward active student participation. We hear frequent suggestions for dealing with the "awkward pause," and discussion of further ways and means for motivating collaboration. As for me, the lecture is still included in my kit of teaching tools. Here, too, there are unfortunate interims, but they are never awkward; my students, without exception, sleep gracefully through them, and you may do the same.

Again, I should warn you that my comments will reflect little of modesty in the expression of my point of view. Years ago, when I first began my teaching, a student came to my office and urged me to present my own attitude concerning the recorded executive decisions of the various managerial issues which we were studying. I demurred, pointing out that my knowledge of the given situation was little more than that of my listeners, and that they would undoubtedly overestimate the worth of any statements I might make; whereupon the student responded: "Oh, don't worry about that, professor. We can allow for you." So, today, I shall speak forthrightly and with candor, realizing that here too, my words must be subject to your kindness of heart.

This day is a happy day for you. Reunions are true carnivals of the heart. Our friends of past years are once more seated beside us in their long-accustomed places. Our memories of past pleasures now once more become realities. Recollections of our youthful days at Technology are refreshed and enjoyed. And we are gratified and inspired to discover how indissoluble are the bonds of earlier friendships which have maintained their potency despite the passage of time. Reunions serve to convince us that the deeper the satisfactions of life, the longer the time during which they may continue to bless us.

Yet of even greater significance to all of you is the fact that this gathering marks your 25th reunion. Why, of all reunions, is the 25th the most significant? I believe it is because it stands at the apogee of life's miraculous span. It marks the turn of our day upon earth, when our morning has run its course. It is the symbol of high noon. As the hands of our cosmic watches point to heaven, we can begin dimly to see something of the changing scenes which lie ahead. We shall not be so childish as to bewail the passing of the days of our youth, nor shall we look with apprehension upon problems of maturity which now confront us. Rather we shall remember the words of the Elder Pliny which President Richard C. Maclaurin caused to have carved in the lintel of the fireplace in his office and which, translated, read: "In endings are beginnings found." So I shall speak to you of five such transitions which lie before you. Though they mark both ends and beginnings, these changes are distinctly gradual in nature, reflecting a shift in emphasis rather than an abrupt adjustment.

As we look forward, we shall be ready to accept the waning of our physical powers as inevitable in the days to come. True, we are much quicker to acknowledge this tendency among others of our classmates than in ourselves. But we cannot gainsay its presence. So we turn, if we are wise, toward the development of a compensating resource. If we have earned the respect and co-operation of those about us, and particularly of the oncoming generation, we shall find that increasingly we may delegate our activities to them, thus multiplying our energies and thereby even enlarging upon our accomplishment.

A little time ago I talked with a Technology graduate who had spent his earlier professional life as a metallurgical consultant. Realizing his lessening ability to become of increasing service solely as the result of his own efforts, he undertook the acquisition and operation of a small business. This undertaking thrived under his hand; and today, in his later years, it yields him the continuing assurance of growing usefulness.

As we pass our meridians, our creative fire, our imaginative verve, our innate inventiveness, tend to lessen in degree. In today's research laboratories, industry depends largely upon the trained and eager

If we have earned the respect and co-operation of those about us, and particularly of the oncoming generation, we shall find that increasingly we may delegate our activities to them, thus multiplying our energies and thereby even enlarging upon our accomplishments.

Underwood and Underwood

minds of the young for those new and extraordinary concepts which may well revolutionize our way of life. Here again, we find countervailing resource in collaboration with others. If we will but employ the newly recognized resources of group speculation and suggestion, of group contemplation, of group ingenuity, we shall find that our practical experience, our tempered judgment, and our somewhat more judicial viewpoint will make us even more useful and essential in the expanding economy in which we live.

The president of a successful enterprise once confessed: "For some reason that is not clear to me, my associates seem to be able more quickly to reach decisions on difficult problems if I am present at the conference. I rarely am able to contribute very much to the actual discussion."

I found the answer in conversation with one of his staff, who explained: "When he is present, we are constantly aware of his desire that we find the right answer to our difficulties, irrespective of personalities or past circumstances. He has always viewed the placing of blame as a cheap political device. He always looks for the cure instead of the culprit, so we feel entirely free to lay any ideas on the table for what they may be worth."

Unless our viewpoint has become warped, and we have grown miserly, we shall find, in the afternoon of life, that our urge for acquisitiveness tends to subside. We still enjoy the thrill of possession; but its poignancy decreases as the days and years pass. On the other hand, if we but give ourselves opportunity, our interest in possessiveness may be replaced by the enjoyment of vicarious contributions. We learn that the doing of helpful things for others brings a new flavor to our efforts that is unique and delightful. Some of us find these contributions bring greatest return when they are made secretly. Again, in later life, our happiest recollections spring from the little things which we did without thought of return which have now flowered into important human services.

There is a deeper significance here. When I was a boy, my father found delight in maintaining a rather extensive rose garden. To be honest, I never waxed as enthusiastic about this as did he. This was largely because I had the frequent and questionable pleasure of carrying prickly bouquets around to neighbors who in turn burdened me with long paeans of praise and appreciation to carry back to my parents – which I consistently failed to do, largely because of a poor memory and a small boy's distaste for compliments.

But I learned one thing from the roses. It was that in their life cycle, which in our climate rarely lasted more than a year, the period of bloom followed upon a growth of stalk and leaf. It has always seemed to me that each one of us, for some interval in our lives, should have opportunity to flower in some characteristic way for the sheer pleasure of the flowering – to stand if but for a moment as an ornament to our Creator – to bloom.

As we move irrevocably into the afternoon hours, we frequently find ourselves viewing our earlier theories, which we stood ready to defend to the end, with a more tempered attitude. The precise eternal verities, which we strongly supported, now appear as single bands in a wider philosophic spectrum. To counterbalance this lessening of abstract conviction, we discover that we may now turn to new and inspiring loyalties in our relationships with people. As the years pass and our acquaintanceship inevitably increases, our range of friendship widens and deepens, and we find our hearts and indeed our minds refreshed and strengthened by the growing warmth of our affection for others. We come to cherish those bonds of respect and confidence that bind us ever more securely one to another.

A distinguished public servant once commented: "In my experience I have found that the strongest organizations are made up of people who have a sincere and abiding admiration for the special talents of each of their associates."

There is yet another kind of loyalty which time seems to strengthen. It is our fidelity to those institutions whose constructive influence extends far beyond the life span of any one of us; from whose service we have benefited; and for whose continuation we strive. To build in our hearts a growing allegiance to such enduring forces for good, is to find a new and deeper sense of service which reaches into the future far beyond our vision.

There is yet another challenge that will present itself to us in the afternoon of life. As our efforts win us new and greater responsibilities, as our accomplishments bring repute and confidence, more of other people's troubles will be laid on our doorstep. And we know that we may not wave them away. More than this, life itself, with its growing complexities, its advancing tempo, its increasing imponderables, often lays before us more difficult problems

(Concluded on page 58)

Raymond E. Hanson

"In endings are beginnings found."

THE INSTITUTE GAZETTE
PREPARED IN COLLABORATION WITH THE TECHNOLOGY NEWS SERVICE

Annual Report of the President

PRESENTED to the members of the M.I.T. Corporation at its meeting on October 5, the report of James R. Killian, Jr., '26, President, was devoted, in large measure, to a restatement of "long-term policies and objectives which guide our current decisions and which keep us on our course." The Institute's plan and philosophy of education serve as a guidepost in administering the vast and increasingly complex affairs of M.I.T.; certainly the text of President Killian's address makes admirable reading for those who wish to be brought up to date and receive proper perspective of recent modifications in the educational program at Technology.

In opening his report, President Killian said: "The responsibilities of the Massachusetts Institute of Technology as a national center for education and research continued to grow during the past year." Such growth inevitably requires modifications, from time to time, in the methods of operation, but the premises upon which the Institute is built remain unchanged. Indeed, some of the statements in the 1953 Report of the President may be regarded as modern rephrasing of basic principles which have guided the Administration since M.I.T. was founded. For example, President Killian reminds us that: "First, we are a professional school in which professional standards of conduct, performance, and unselfish public service are controlling. . . . Next, we carry on our work in the spirit of the university, including in close relationship postdoctoral, graduate, and undergraduate learning, with the spirit of research and other forms of creative scholarship infusing all our educational activities. . . . Another important policy of the Institute is to maintain through a unified Faculty a symbiotic relationship between graduate and undergraduate study. . . . In both graduate and undergraduate study and in our community life, the Institute stresses 'learning by doing.'"

Technology Alumni will not be surprised at such statements of educational philosophy. During their student days at M.I.T. they had ample opportunity to observe, in full operation, working examples of such basic philosophy. In condensing the President's Report for the benefit of Review readers, therefore, greatest stress will be placed on those topics which may not be generally recognized, or on new, unusual, or urgent problems calling for early solution.

Directing attention to our student body early in his address, President Killian states: "Our student body is not limited to any one type. We want students who can become successful leaders of men as well as students who can become brilliant specialized research scholars (the two are, of course, not mutually exclusive). One of our principal responsibilities is to educate managerial and leadership talent for our society. This means we must seek students competent intellectually but gifted and adept in human relations, men having the right combination of attractive personal traits to make them natural leaders.

If the Institute's students are not the one-sided kind of individual that popular conception sometimes imagines, neither is its educational program. "We at M.I.T.," says Dr. Killian, "do not accept the view that breadth and humanism in education are the exclusive property of a particular kind of education. Breadth and humanism may be achieved by students of law, of medicine, of engineering, of the liberal arts, and of the social sciences. Breadth and humanism may also be found lacking in any one of these fields."

During and since World War II, M.I.T. has been called upon to play an exceedingly important role in research for national defense. Such research activities as Technology has been called upon to undertake, primarily at the request of the federal government, have greatly expanded the Institute's personnel, space requirements, and budgets. Sponsored research has infused a new degree of practicality in teaching, particularly at the graduate level; it has also posed a number of difficult problems. With regard to its present research activities, President Killian states:

> In its research policies the Institute prefers not to limit itself to any narrow or doctrinaire definition of what is appropriate research for an educational institution. We seek to encourage the uncommitted scholar and the researcher who works alone.
>
> We know from extensive experience that sponsored research can enrich our educational program, and we do not share the extreme view sometimes expressed that sponsored research *ipso facto* is bad for education. All sponsored research should contribute to the educational objectives of the institution, should be something that the participating staff members wish to do, and should be open to graduate students. These considerations have governed our management of sponsored research.
>
> In addition, we have recognized an inescapable responsibility in this time of crisis to undertake research in support of our national security which under normal conditions we would choose not to undertake. We propose to see this research through and to make our special competence available so long as national policy and need indicate that we should. When these conditions no longer hold, we shall withdraw from classified emergency research with enthusiasm and relief. In the meantime, we are finding ways to manage this research so that it does not, on balance, detract from our educational program.
>
> I believe that the willingness of the Institute following the war to accept large sponsored research projects has made it possible greatly to increase our over-all contributions to the nation, enabled us in time of need to create the Lincoln Laboratory and similar projects, and made possible the maintenance of a scientific "fleet in being" of great importance to national security.

In addition to its relationships with government, the Institute cultivates wide contacts with industry. The flour-

ishing state of technology in the United States reflects a close articulation and understanding between education and industry.

Modifications in 1952–1953

In a review of the major changes which have been made during the 1952–1953 school year, President Killian reports:

With the above concepts and policies before us, let me now list the following important modifications made during 1952-1953 in our program, organization, and environment:

1. Revision by the Faculty of our first-year curriculum to permit freshmen more choice and greater flexibility and to reduce the required number of contact hours.

2. A further recasting of our program in general education, including a thoroughgoing replanning of the two-year common core for freshmen and sophomores to provide a better integration of the humanities and social sciences.

3. Establishment of a Division of Biochemistry in the Department of Biology and the consolidation of the Department of Building Engineering and Construction with the Department of Civil and Sanitary Engineering. A decision was reluctantly reached to discontinue the Civil Engineering Summer Camp and to teach surveying at and around M.I.T.

4. Other important changes in courses and curricula included the replanning and re-equipping of freshman laboratory instruction in physics; a major reorganization of the curriculum in Electrical Engineering, deferring specialization until the senior year and including a fresh and more fundamental approach to the study of power; revision of the graduate program in physical chemistry; recasting of elective sequences in the School of Humanities and Social Studies; provision of new graduate subjects in the School of Industrial Management; and the decision of the Faculty again to require a thesis or project, representing independent work, for the S.B. degree.

5. Adoption of a new plan of stabilized enrollment providing for a limitation on the freshman class of 900. Studies of our staff and buildings show clearly that a student body of at least 5,000 can be amply accommodated.

6. Acceptance by the governing bodies of the Institute of a new tenure plan, devised by a committee of the staff, relating the granting of permanent tenure to age as well as to length of service, providing for more administrative flexibility in the appointive process, and removing inequities in the old plan.

7. Completion of a two-year plant modernization and space reallocation program involving an expenditure of $2,000,000; this included a much needed modernization and consolidation of the Electrical Engineering teaching and research quarters.

8. Inauguration of the Division of Defense Laboratories for the purpose of segregating classified military research from the educational activities of the Institute, to afford specialized fiscal management of large off-campus sponsored research, and immediately to provide for the Lincoln Laboratory, operated for the U. S. government at Bedford.

In his report, President Killian also directs attention to changes which have been made, especially during the past year, in administrative decentralization. To a greater extent than before, increased responsibility for the Institute's academic and business activities are being assumed by Julius A. Stratton, '23, Vice-president and Provost, and Joseph J. Snyder, 2–44, Vice-president and Treasurer, respectively. In addition, the academic deans have assumed greater responsibility for the operation of their schools with the result that now each school has a better opportunity to develop its own educational personality. But while administration has become more decentralized, "our unified Faculty, broken up neither by schools nor by graduate and undergraduate programs, is the major co-ordinating agency for educational policy," says Dr. Killian.

Unsolved Problems — Unfinished Business

Sufficiently newsworthy as to be reproduced in full is that section of the report dealing with problems currently confronting the Institute's Administration:

So far I have been reporting items of policy, change, improvement, and progress. I must also report certain failures and numerous items of unfinished business.

I do not believe that we have yet devised an adequate method for recognizing and rewarding exceptional and imaginative teaching in the undergraduate school. Everyone wants to do something about this, and some progress has been made – but not enough.

We should constantly be making and recognizing innovations and advances in teaching as well as in research.

The Institute has critical need for a physical sciences building. We have not yet found the fund sources to provide the $2,000,000 needed for the building and an equal amount for endowment. We should not build additional plant without additional endowment to maintain the additions.

While our level of gifts is gratifyingly higher than before the Development Program, we have not yet found an approach to long-term development which promises greatly to increase funds available for endowment. Diligent efforts are being made to step up our activity. We need to be adding $4,000,000 a year to permanent funds; for the past two years we have averaged nearly $2,500,000.

Neither have we been able to increase our scholarship funds adequately. M.I.T.'s scholarship aid to undergraduates compares unfavorably with that given by other institutions. This year, for example, a sister institution completed a survey of undergraduate scholarship awards granted during 1951-1952 by eight leading technical schools and four well-known universities. One school in this group awarded scholarships which amounted to 27.8 per cent of the total undergraduate tuition income. M.I.T., where 7.5 per cent of tuition fees was awarded in scholarships, stood at the bottom of the list, though this kind of analysis ignores the great assistance provided by our Loan Fund.

Recent increases in undergraduate scholarships have been made possible, to a large extent, by a decision to use the accumulated income of our scholarship funds at an accelerated rate. If the present scale of awards is to be maintained in the future, it becomes mandatory that our capital endowments for scholarship be augmented to provide the necessary income.

In common with many colleges and universities, our scholarship applications from entering freshmen continue to show a sharp upward trend. For the class entering in the fall of 1953, more than 1,500 requests, a 50 per cent increase over the previous year, were processed and considered.

For these reasons, it is clearly incumbent on us to find the means not merely to maintain but to extend our undergraduate scholarship aid.

A review of Corporation Visiting Committee reports reveals many recommendations which we are still unable to put into effect for various reasons. These include:

completion of basic equipment for the Hydrodynamics Laboratory ($50,000); relief of space congestion in the Department of Geology and Geophysics; equipment changes necessary fully to implement the new branch libraries; reconstitution of our program in Shipbuilding and Ship Operation; provision of more adequate scholarships and fluid funds for the School of Architecture and Planning; provision of program and means for a Center of Urban Studies; further adaptation and decentralization of student government to meet needs of our enlarged residential system. To these should be added $50,000 of equipment for Food Technology, $85,000 for the Metals Processing Laboratory, $25,000 to complete the equipment modernization of the Electrical Engineering Laboratories, and some $200,000 for improvements in buildings and grounds. These items must be cared for out of new capital funds not now in hand.

In speaking of new monies needed, I must also emphasize the need for economy in all our activities. As a result of inflation and other factors we face a period of austerity and budget reductions. We seek to handle these reductions without doing injury to our academic work. Toward this end we have made a start, but much remains to be accomplished. One of the jobs ahead is to review subjects of instruction to see whether our present offering is unjustifiably large.

In his annual report, John E. Burchard, '23, Dean of the School of Humanities and Social Studies, calls attention to our need for "freedom money" to assist Faculty members to do many things contributing to their professional development and teaching which cannot be financed out of regular budgets or through grants for research projects. The need for such fluid funds is not limited to the Humanities and Social Studies. A small amount would go a long way.

George R. Harrison, Dean of the School of Science, in his report, emphasizes our responsibility at M.I.T. to do our part in helping to encourage more able people to go into secondary school science teaching. The dearth of such teachers is increasing, and there is danger that science in America will suffer.

We have already made two moves: establishing the Westinghouse Summer Program for Teachers of Science and Course IX-C for students wishing to go into science teaching. Both of these are good but not enough. Our association with the Boston *Globe* in holding in Rockwell Cage the annual Massachusetts Science Fair has been important in acquainting us with science teachers and their problems. We need particularly to encourage more students to go into Course IX-C. We should consider a special graduate degree for secondary school teachers. I am happy to report that Dean Harrison has volunteered to explore ways for M.I.T. to help make careers in secondary school teaching more attractive.

Statistics of the Year

In that portion of the President's Report dealing with statistics we learn that the student body last year numbered 5,074 of whom 7 per cent were veterans and 16 per cent were married. Of 96 women who were enrolled, 38 were graduate students. Foreign students numbered 464, and they came from 86 foreign countries. M.I.T. continues to enroll the highest percentage of foreign students of any university in America. Enrollment in the Graduate School last year was 1,921. Total population at M.I.T. – including students, staff, and other personnel which make up the Technology community – exceeded 11,000.

The Institute's endowment and other funds now have a total book value of $59,940,000 invested in securities and other assets with a market value of $73,080,000. Plant assets stand at $33,065,000, which figure is approximately $1,700,000 above that of the previous year. For the sixth successive year the income allocation to funds sharing the general investments was at 4 per cent of book value. Unallocated investment income in the amount of $500,000 was added to the balance of undistributed investment income, bringing this reserve up to $1,797,000.

The Institute's Faculty and staff continue to roll up impressive records of honors, awards, prizes, and appointments in recognition of their professional competence and civic responsibility. Seven are heads of national professional societies; 17 national and international professional awards have been made to 15 Faculty members; honorary degrees were awarded to 5, and honorary professorships in foreign countries are held by 2 Faculty members.

Although M.I.T. does not offer work in a number of fields for which fellowships are awarded, 63 National Science Foundation Fellows – 11 per cent of all selected for fellowships – have selected M.I.T. as the place for continuing their study.

No difficulty would be experienced in continuing documentation of the many interesting and impressive facts which indicate the Institute's position in higher education in the United States. Alumni who are interested in such matters will find details in President Killian's annual report to the M.I.T. Corporation. In this condensation of his report, it is sufficient to say that the facts provide ample justification for continued confidence that, under the present Administration, the Institute maintains its sound and leading position in the nation's institutions of higher education.

M.I.T. Photo

Reflections – M.I.T. Sailing Pavilion

Arlington Photo Studio

As a part of the 50th reunion activities of the Class of 1903 on the week end of June 12, members of the Class, their wives, and guests were photographed at the Milton home of Frederic A. Eustis, Class Secretary, prior to a journey to Coonamessett Ranch Inn on Cape Cod where the class gathering was held. Seated in the front row on the ground, from left to right, are: Walter P. Regestein, Clarence M. Joyce, Mrs. Margaret H. Shurcliff, James W. Welsh, William O. Eddy, Edward M. Chadbourne, Emmor H. Millard, James R. Killian, Jr.,'26, President of M.I.T., Mrs. Roger D. Babson, Karl T. Compton, Chairman of the M.I.T. Corporation, James S. Sheafe, and George B. Wood. The four people seated in the center, in the second row are: Miss Susan L. Clarke, Mrs. LeRoy B. Gould, Mrs. James W. Welsh, and Class Secretary Eustis. Standing, from left to right, are: Frederick K. Lord, Mrs. Clarence M. Joyce, George B. Bradshaw, Curtis R. Gray, Miss Clara Cushman, Mrs. Curtis R. Gray, William E. Mitchell, Charles L. Bates, James A. Cushman, Omar S. Swenson, Mr. and Mrs. Augustus H. Eustis, Ralph H. Howes, Charles B. Cox, Hermon F. Bell, Leroy L. Hunter, Andrey A. Potter, LeRoy B. Gould, Mr. and Mrs. George H. Garcelon, Ichabod F. Atwood, a guest, Mrs. Frederic A. Eustis, Ernest A. Comer, Mrs. Thomas E. Sears, Mr. and Mrs. Alexander Healy, Mr. and Mrs. John J. Dooley, Thomas E. Sears, Mr. and Mrs. Howard S. Morse, Carlton F. Green, J. Tyrrell Cheney, Mr. and Mrs. Paul R. Parker, Mrs. Karl T. Compton, Arthur B. Allen, Mrs. Arthur A. (Sophie T.) Blunt, Roger D. Babson, and George C. Capelle.

Reorientation

IN keeping with its constant vigilance to direct the various curricula of the Institute toward the best possible content for educating students for professional careers, there has developed for some time now, an Institute-wide trend away from subjects primarily concerned with manual skills or details of professional practice, in favor of those that place greater emphasis on the basic principles of science and engineering. Almost always expansion of services and facilities is required when education is placed on a more scientific basis; occasionally, however, such reorientation calls for quite a different approach.

For some time it has been difficult to justify extensive training in surveying field practice when this activity is viewed in terms of education for modern professional engineering. As recorded in the President's Report (see page 28 of this issue), in the future, surveying, with even greater emphasis on basic principles and with broader concepts of application will be taught in Greater Boston rather than at the Institute's Summer Surveying Camp in East Machias, Maine. This decision was made by the Executive Committee of the M.I.T. Corporation in accordance with the recommendations of a special subcommittee of the Visiting Committee on the Department of Civil and Sanitary Engineering, which recommendations are included in the March 2, 1953, report of the Visiting Committee.

Because Alumni – especially graduates of Courses I, XI, and XVII – will be interested in the factors leading to the recommendation that the Summer Camp be discontinued, the report of this Visiting Committee (beginning on page 31) is published at the earliest possible moment.

Speer Becomes Associate Dean

EFFECTIVE with the fall term of 1953, William Speer, formerly headmaster of the Loomis School at Windsor, Conn., was appointed associate dean of students at the Institute, with duties which will emphasize the needs and welfare of individual M.I.T. students. James R. Killian, Jr., '26, M.I.T. President who announced the appointment, noted that the new auditorium and chapel now being built at M.I.T. would provide Dean Speer with new facilities that will give the M.I.T. community a "meeting house" on which to focus its spiritual and humanistic interests.

In association with E. Francis Bowditch, Dean of Students, Dean Speer will correlate all counseling activities at the Institute and will organize and coordinate discussions bearing on the development of a spiritual program. He will also serve as Faculty adviser to the religious department of the Technology Christian Association.

Mr. Speer, a native of Englewood, N. J., where he was born in 1910, was educated in the Englewood public schools, the Hotchkiss School, and Princeton University, from which he was graduated in 1933. At Princeton he majored in philosophy, and was a member of the junior varsity crew. From 1933 to 1941 he taught at the Asheville School in North Carolina and the Shady Hill School in Cambridge.

In 1941, Mr. Speer served as assistant to the headmaster of the Gilman Country Day School in Baltimore, until 1942 when he entered the United States Naval Reserve. Upon his return to civilian life in 1946, Mr. Speer served as director of admissions and director of student life at Rutgers University. He served the Loomis School as headmaster from 1949 to 1952.

Herman R. Kurrelmeyer: 1876-1953

ANNOUNCEMENT is sadly made of the death on August 28, 1953, of Herman R. Kurrelmeyer, Professor of German, Emeritus. Professor Kurrelmeyer retired in 1947 after more than 40 years as a teacher in the Department of Modern Languages at the Institute.

He was born in Osnabrück, Germany, in 1876, and was educated at the Johns Hopkins University, where he was awarded the degrees of bachelor of arts and doctor of philosophy in 1899 and 1902, respectively. He joined the staff of the Institute in 1902 as an instructor in modern languages, and was named assistant professor of German in 1912. Three years later he was made an associate professor, and was appointed professor of German in 1927.

New Appointments

APPOINTMENTS of five new members of the Faculty at the Institute have been announced by James R. Killian, Jr., '26, President, during the summer. The new appointments name Wroe Alderson to be visiting professor in the School of Industrial Management for the fall semester, Edward G. Bennion to be visiting professor in the Department of Economics and Social Science, Gordon R. Williams, '29, to be associate professor in the Department of Civil and Sanitary Engineering, Robert R. Rathbone to be assistant professor in the Department of Humanities, and Charles W. Rosen as assistant professor of modern languages.

Wroe Alderson, partner of Alderson and Sessions, Philadelphia marketing and management counsel, will participate in the development of the program of research in marketing currently being undertaken by the School. He will also teach on the graduate level.

Professor Alderson has received several distinguished honors in this field, including annual awards from the American Marketing Association in 1947 and 1949 and the Pabst Award of 1944. Born in St. Louis, Professor Alderson holds the degree of bachelor of arts from George Washington University; he has done graduate work at that institution and at the University of Pennsylvania.

A partner of Alderson and Sessions since 1944, he was a business specialist with the Department of Commerce from 1925–1934 and a market analyst with the Curtis Publishing Company from 1936–1943.

Professor Bennion, Head of the General Economics Division of the Standard Oil Company of New Jersey received the degrees of bachelor of arts (1930) and master of arts (1934) from the University of California at Los Angeles, and the degree of doctor of philosophy from Harvard University in 1942. He was an instructor and tutor in economics at Harvard University from 1938 to 1943 and has been a lecturer in economics in Columbia University's Graduate School of Business since 1948.

Dr. Bennion joined Standard Oil of New Jersey in 1943 as a staff economist and has been head of the General Economics Division since its establishment in 1945.

Professor Williams brings to M.I.T. extensive experience in civil engineering projects overseas as associate and chief hydraulic engineer with the firm of Knappen-Tippetts-Abbett-McCarthy, consulting engineers of New York. Since 1946 he has had charge of field investigations and hydraulic and hydrologic studies for power, irrigation, and flood control developments in foreign countries as well as in the United States. Previously, beginning in 1939, he was associated with U.S. Engineer Offices in Baltimore, Wilkes-Barre, Syracuse, Washington, D.C., and Providence.

At M.I.T. Professor Williams will teach courses in hydraulic engineering and hydrology. He was graduated from the Institute in 1929 with a bachelor of science degree in civil engineering. He has served as lecturer in civil engineering at Columbia University and is a member of the Hydrology Section of the American Geophysical Union and an associate member of the American Society of Civil Engineers. Professor Williams was awarded the James Laurie Prize of the American Society of Civil Engineers in 1944.

Professor Rathbone first came to M.I.T. in 1948, and since then has been serving as technical writer for the Digital Computer Laboratory and other research activities. While teaching in this field, beginning this fall, he will continue part-time association as technical writer with M.I.T.'s Lincoln Laboratory.

A native of Exeter, N. H., Professor Rathbone attended Phillips Exeter Academy. He holds degrees from Middlebury College (B.A., 1939) and Harvard University (M.A., 1947). Before coming to M.I.T., he held teaching positions at the Gould Academy in Bethel, Maine, and in high schools in Glens Falls, N. Y., and Swampscott, Mass. During World War II he served as a lieutenant with the U. S. Naval Reserve from 1942–1946. Professor Rathbone is author of several technical articles.

Dr. Rosen will be responsible for basic courses in history and literature which will be taught in the French language beginning this fall to a few selected M.I.T. freshmen. This unique experimental program is made possible by a grant from the Rockefeller Foundation.

Dr. Rosen was born in New York City in 1927 and attended the public schools there. He received his bachelor of arts degree with highest honors from Princeton University in 1947 and continued his studies at Princeton from 1947 to 1951 holding four distinguished fellowships in modern languages and literature. He was an assistant in instruction in the Princeton Department of Modern Languages and Literatures from 1948 to 1950, and received the M.A. and Ph.D. degrees from Princeton in 1949 and 1951, respectively. Dr. Rosen made his debut as a pianist in New York in March, 1951.

A Transit View

MEETING at the Institute on March 2 and 3, 1953, members of the Visiting Committee on the Department of Civil and Sanitary Engineering* included a visit to the laboratories as a part of the program of the two-day meeting, and concluded their activities

* Members of this Committee for 1952-1953 were: Thomas C. Desmond, '09, chairman, William J. Orchard, '11, Eugene L. MacDonald, '13, Alfred T. Glassett, '20, George J. Leness, '26, John M. Kyle, and George R. Rich.

Bob Dixon

Celebrating the enjoyable occasion of a 40th reunion, 101 members of the Class of 1913 and their wives gathered for the week end of June 12, 1953, at the Oyster Harbors Club in Osterville. Reading from left to right are: First Row—*Frederick W. Lane, Francis H. Achard, Silas H. Champlin, William R. Mattson, Mrs. Ellis W. Brewster, Clarence J. Berry, Mrs. Thomas Bain, Miss Neva Bain, Walter P. Muther, Harold E. Crawford, Charles E. Trull, Mrs. Nathaniel McL. Sage, and Nathaniel McL. Sage.* Second Row—*Mrs. Robert D. Bonney, Max L. Waterman, Eugene L. MacDonald, Paul C. Warner, Gordon G. Howie, Joseph H. Cohen, David Stern, Robert W. Weeks, Clarence W. Brett, Frederick D. Murdock, William A. Ready, R. Charles Thompson, Hilding N. Carlson, Nathan H. Poor, 2d, Stanley H. Davis, Kenneth W. Reed, John B. Farwell, Geoffrey M. Rollason, and Henry W. Dew.* Third Row—*Mrs. Max L. Waterman, Mrs. Robert W. Weeks, Mrs. Gordon G. Howie, Mrs. Paul V. Cogan, Mrs. Stuart J. Eynon, Mrs. David Stern, Mrs. Joseph H. Cohen, Mrs. Charles H. Wood, Mrs. Harold E. Crawford, Mrs. Clarence W. Brett, Mrs. Geoffrey M. Rollason, Mrs. Francis H. Achard, Mrs. Hilding N. Carlson, Mrs. Nathan H. Poor, 2d, Mrs. Fred C. Hersom, Mrs. Kenneth W. Reed, Mrs. John B. Farwell, Mrs. R. Charles Thompson, Mrs. George P. Capen, and Mrs. Stanley H. Davis.* Fourth Row—*Allen F. Brewer, Harold M. Rand, Edward H. Cameron, Raymond B. Haynes, Fred C. Hersom, Paul V. Cogan, James G. Russell, Arthur L. Townsend, Percy G. Whitman, A. Laurence Brown, Robert D. Bonney, George P. Capen, and Walter R. Bylund.* Fifth Row—*Mrs. Allen F. Brewer, Mrs. Henry W. Dew, Mrs. Charles W. Gotherman, Mrs. Harold M. Rand, Mrs. Herbert G. Shaw, Mrs. Edward Hurst, Mrs. Percy G. Whitman, Mrs. A. Laurence Brown, Mrs. Gilbert R. Pardey, Mrs. Bion L. Pierce, Mrs. Howard S. Currier, Mrs. William N. Eichorn, Mrs. William A. Ready, Andrew Vogel, Mrs. William R. Mattson, Miss Janet Mattson, Thomas S. Byrne, Mrs. Laurence C. Hart, and Laurence C. Hart.* Sixth Row—*Robert J. Tullar, Stuart J. Eynon, Charles W. Gotherman, Herbert, G. Shaw, Ellis W. Brewster, Edward Hurst, Emerson L. Bray, Kenneth A. Scott, Charles H. Wood, Morris F. Hall, Gilbert R. Pardey, Bion L. Pierce, Mrs. Clarence J. Berry, William N. Eichorn, Howard S. Currier, Mrs. Burton L. Cushing, and Burton L. Cushing.*

with a luncheon and final session at the Faculty Club. Also present at various of the Committee gatherings were: Edward L. Cochrane, '20, Dean of the School of Engineering; Karl T. Compton, Chairman of the Corporation; Walter H. Gale, '29, Secretary of the Institute; James R. Killian, Jr., '26, President; Robert M. Kimball, '33, Director, Division of Business Administration; Malcolm G. Kispert, 2–44, Executive Assistant to the President; and Professor John B. Wilbur, '26, Head of the Department.

Last year, a committee under the chairmanship of Eugene L. Macdonald, '13, studied instruction in surveying with special reference to field work at M.I.T.'s summer surveying camp at East Machias, Maine. In keeping with its constant vigilance to direct the various curricula of the Institute toward the education of students for professional engineering, there has developed an Institute-wide trend away from subjects primarily concerned with manual skills or details of professional practice, in favor of those that place greater emphasis on the basic principles of science and engineering. In keeping with this general trend, it appears possible to improve the curriculum in Civil Engineering by reorienting instruction in the important subject of surveying toward broader and more fundamental objectives. While the measurement of angles and distances that define the surface of the earth would form an important part of this new concept, other types of measurement and data processing in civil engineering would also be treated. Familiarity with manual means of taking measurements is essential, but a broad treatment of the principles involved appears to supersede, in relative importance, the development of manual skills or field work as part of the formal educational program.

If instruction in surveying is reoriented as suggested, the theory of surveying, together with less extensive formal training in surveying field work, might be taught at Cambridge in the regular school year. As a corollary to this suggestion, the present program of summer jobs for Civil Engineering students should be continued aggressively, so that the limited formal training in field work will be strengthened by on-the-job experience. If, in addition to summer employment, there is need for a summer course in surveying field work, on an optional basis, consideration should be given to such a program.

Something will of course be lost in giving up the camp, which so many of the graduates of this Department look back upon with sincere affection, but the majority of this Committee believes that the Course in Civil Engineering would be strengthened by these changes in the teaching of surveying, and therefore

(Continued on page 34)

BUSINESS IN MOTION

To our Colleagues in American Business . . .

Many people think that copper is just copper, and brass is brass, whereas there are several types of copper, and many kinds of copper alloys, all available in various forms, finishes and tempers. Choice of the correct metal, temper, shape and fabrication methods often makes a tremendous difference. Here are some examples.

• A communications-equipment manufacturer began development of a new relay. The original design called for a rectangular copper tube of a size that could not be made economically. The Revere Technical Advisory Service and our Methods Department discussed this problem with the customer at considerable length. Design changes were made which satisfied everybody, and made the relay commercially practical at no sacrifice in performance.

• A lock maker was generating a lot of scrap in machining cylinder lock sleeves from bar. We suggested tube, but analysis showed only an even break on cost of material. Further study, however, revealed that tube would bring about substantial savings, due to longer tool life, less collet wear, less scrap to handle, and a smaller inventory of metal for the same output. The customer switched to tube to obtain these economies.

• When a maker of electrical lugs and terminals found a pile of 40,000 rejected parts we were asked for advice, though the copper strip did not come from Revere. The Research Department worked all night, and reported embrittlement of the metal caused the cracking, and in addition, brazing practices were incorrect. The proper metal and better brazing licked the problem.

• We had the opportunity to study the fabrication methods employed by a customer, and found they could be improved materially. Changing from silver soldering to welding, and working out better jigging methods cut fabricating costs by an amazing 90%.

• When a competitive metal wouldn't work for a soap dish maker because it cracked at the bottom corners, Revere was called in. The Technical Advisory Service studied the dish, which is of the wall-recess type, and also the drawing process. Revere's 70-30 brass was recommended in a specified temper. This cured the difficulty at once.

• Once in a while it is not the metal at all that causes difficulty. A large manufacturer of flashlight cases was troubled with staining of the brass. The Technical Advisory Service and the Methods Department could find nothing wrong with our metal, so asked the oil company engineers to collaborate. They changed the die lubricant, thus solving the problem.

One of the important facts about American business is that it is competitive, and an important part of competition is the endeavor to give a little extra service. Often it turns out to mean a lot, as in the cases just cited. Please remember that your suppliers, no matter who they may be, are eager to give you the benefit of their special knowledge. Call on them for it and let them supply you with much more than materials.

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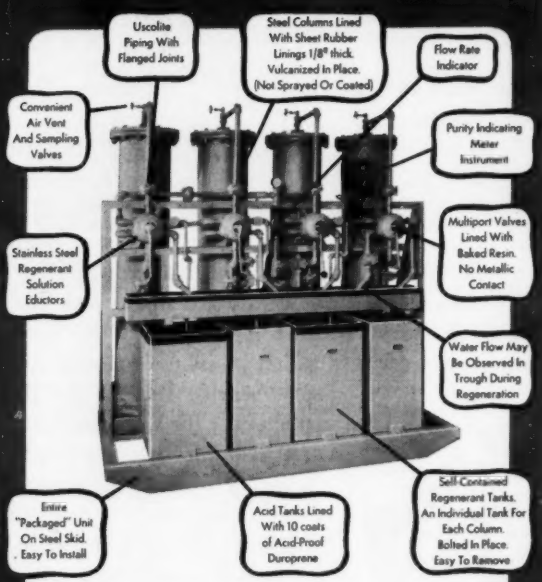
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(*Continued from page 32*)

reluctantly concludes that the summer surveying camp at Machias should be discontinued. This conclusion is in no sense a criticism of those who have been responsible for its operation; indeed, this Committee wishes to commend Herman J. Shea, '33, Associate Professor of Surveying, and his associates for their creditable work at Machias.

Transportation, for which the civil engineer plans, designs, and constructs the ground facilities, occupies so vital a position in our civilization that it touches on every sphere of human endeavor. The congestion of traffic, a single phase of transportation, has been called the first of the five great problems confronting the civil engineer.

Because of the retirement in June, 1954, of Professor John B. Babcock, 3d, '10, Head of the Division of Transportation and Surveying, the appointment of a successor is under consideration – a matter on which the future of this division is largely dependent.

While the Department now offers undergraduate and graduate subjects in soil mechanics, it would be desirable to expand the program so that a graduate student working for a master's degree could elect a program of studies centered on soil mechanics and its related subjects. Donald W. Taylor, '34, Associate Professor of Soil Mechanics, proposed a new arrangement of graduate subjects, dependent on the addition of a new Faculty member. The Committee believes that the importance of soil mechanics warrants this expansion.

For the past two years this Committee has recommended a substantial special appropriation to complete the basic equipment for instruction and research in the new Hydrodynamics Laboratory. It was only possible for the Administration to appropriate $2,100 during 1952–1953, and therefore this Committee brings the matter to attention once more, and urges that it be given a high priority.

In conclusion, the Committee is again pleased to report that the Department continues to grow and to flourish under the leadership of Professor Wilbur. Certainly its recent accomplishments and current condition are such that it has our complete confidence.

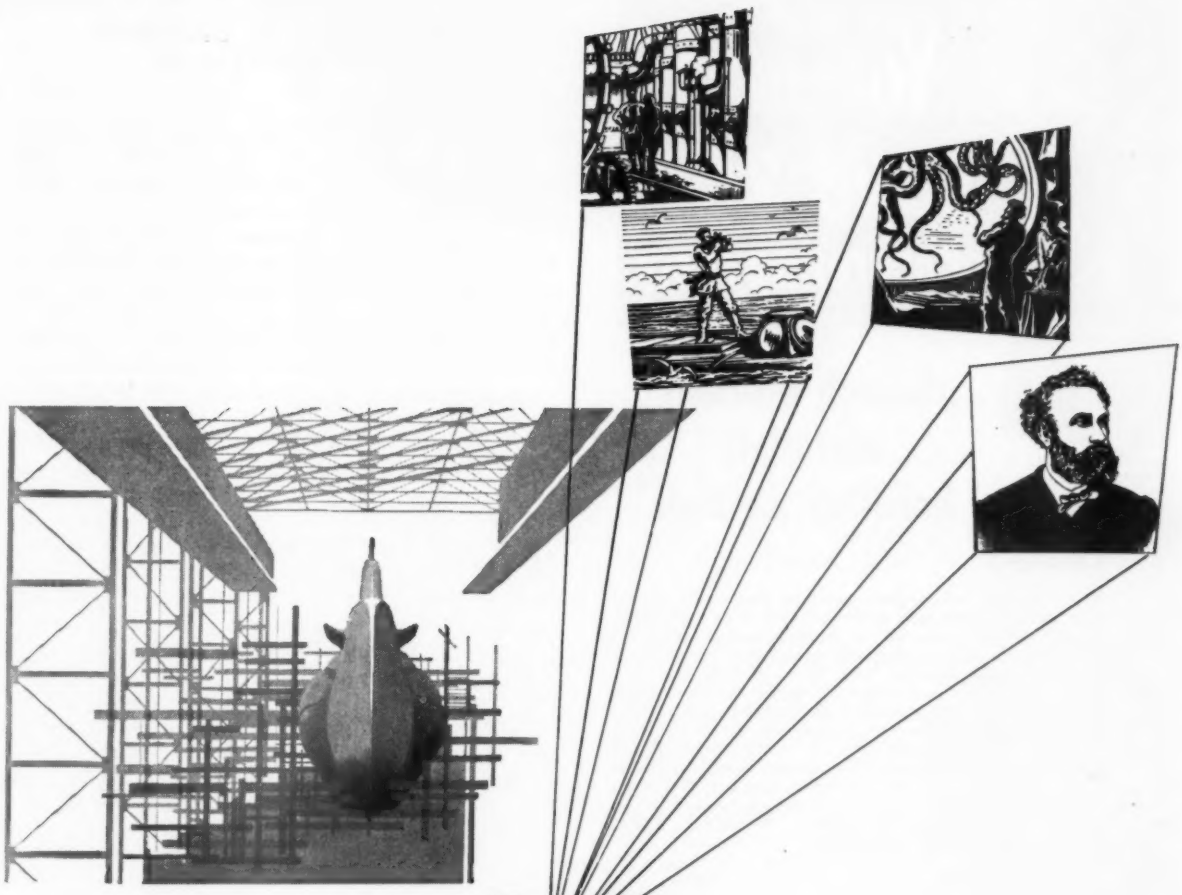
The report of this Committee, summarized above, was made available for publication in The Review on July 29, 1953.

Electrical Engineering Conversions

THE Visiting Committee on the Department of Electrical Engineering* met at the Institute with Gordon S. Brown, '31, new Head of the Department, on February 19, 1953. Joining the Committee for most of the session and a tour of that part of the Institute being converted to provide better laboratories and

(*Continued on page 36*)

* Members of this Committee for 1952-1953 were: Harold B. Richmond, '14, chairman, Francis J. Chesterman, '05, Thomas J. Killian, '25, Edward J. Poitras, '28, Edwin H. Armstrong, Harald T. Friis, James W. McRae, and Gwilym A. Price.



FANTASY into FACT

In 1869, novelist Jules Verne created a scientific fantasy about the "Nautilus", a fictional submarine capable of traveling "Twenty Thousand Leagues Under the Sea". Today, a real "Nautilus" is under construction by General Dynamics. When launched in 1954, the "Nautilus" will be able to cruise *indefinitely* — propelled by atomic power. Recently at our Electric Boat Division yards, the Secretary of the Navy laid the keel plate of the "Sea Wolf", a nuclear powered submarine of entirely *different* design!

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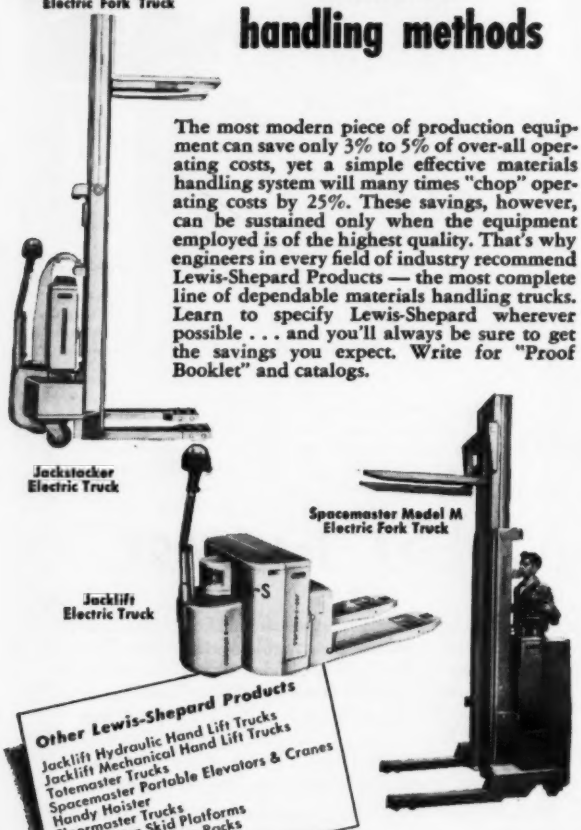

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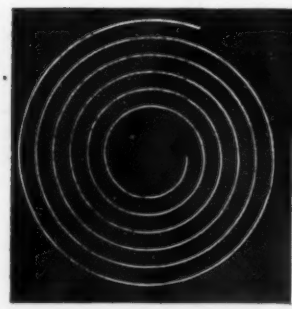
(*Continued from page 34*)

offices for the Department were officers of the Administration – Karl T. Compton, James R. Killian, Jr., '26, Julius A. Stratton, '23, Edward L. Cochrane, '20 – and members of the Department.

Substantially all of Building 10, beneath the old Central Library, is being arranged for Department use. While not providing materially greater space, the new arrangement (which includes a regrouping of laboratory facilities) will make possible a consolidation of academic activity that the Department has not enjoyed for nearly two decades, as well as affording a more intimate contact between students and staff. Dr. Brown opened the discussion by mentioning that, under the guidance of the Faculty Committee on Undergraduate Policy, a healthy review of undergraduate education is taking place at the Institute. This Faculty Committee will recommend a plan for injecting flexibility into the freshman year. Dr. Brown then explained an action of his own Department which culminated in a sophomore curriculum that was put into effect in the fall of 1952. A most significant step was the decision to present a full-year subject on circuit theory under the leadership of Professor Ernst A. Guillemin, '24. Instruction in both class and laboratory has been carefully co-ordinated, and now each student enters his junior year with a good foundation in mathematics, physics, and circuit theory, supplemented by humanities and applied mechanics.

Dr. Brown asked the Committee's attention to the question of junior and senior curriculum substance and options (which the Department has been reviewing) since the Department was about to initiate a radical revision of its policies and curriculums, particularly in the general power area. He emphasized the concern among electrical engineering educators and leaders of industry over the fact that the field of electric power is not attracting a sufficient number of students with adequate intellectual ability to meet the needs of the time. Actually what seems to be needed is a broadening of the base of scientific substance in this field, and an upgrading of its professional content in order that bold creative exploitation of energy conversion and energy utilization techniques can make possible the continued expansion of one of the key elements in our economy.

(*Concluded on page 38*)



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THE INSTITUTE GAZETTE

(*Concluded from page 36*)

The Committee believes that two tasks face departments of electrical engineering. The first task is to make clear to industry and public utilities in particular that employment offered to graduates in the electric power field is rarely as professional as that offered by employers in the electronics field; that the government's attitude toward public utilities should not inhibit creative professional thinking; and that on-campus research under their sponsorship is essential. The second task immediately is to make its own on-campus environment a creative one. As Dr. Brown points out, the function of a university is not merely to teach effectively the known art of the day, but also nourish creative activity to guide the future.

The future program of the Department is aimed at both of these tasks. Specifically, the Department will divest the curriculum of the old traditional substance of instruction in power, and replace it by a broader and more modern scientific substance. A new subject, "Control and Conversion of Energy" (to be taken with "Electronic Circuits") will be offered during the junior year. Dealing initially with magnetic, dielectric, and conducting materials, with the importance of materials in industry, this new subject will aim to show how engineers exploit the properties of materials in a creative way, to solve broad engineering problems. Much new work, for example, magnetic and dielectric amplifiers and transducers, will be presented. The treatment of components in the steady state will be subordinated to a treatment of the dynamics of energy conversion at the systems level.

As much of the traditional instruction in machinery will be discontinued, a new concept for laboratory instruction on energy conversion devices and systems will emerge. Laboratory instruction will co-ordinate with classroom instruction. Much of the equipment in the present electrical machinery laboratory is inadequate, and new equipment will be needed. The new subject "Control and Conversion of Energy" will aim to bring about a closer coupling between science and engineering.

Allied to the problems of curriculum substance is the subject of options. At present, students are expected to select their options during the sophomore year. The new program will maintain substantially a core curriculum, stronger in science than heretofore, through to the end of the junior year; thus, undergraduates may defer a choice until they are seniors.

To support the work in the power field – redefined as the Field of Energy Conversion, Control, and Utilization – a strong program of creative graduate research is in process of development.

The Committee concluded that the recommendations of Dr. Brown are sound, and although the work in the fourth year was not yet ready for formal adoption, the Committee urged that the proposals as outlined be referred to the Institute Executive Committee for adoption.

The Committee's report, as summarized above, became available for publication in The Review in July.

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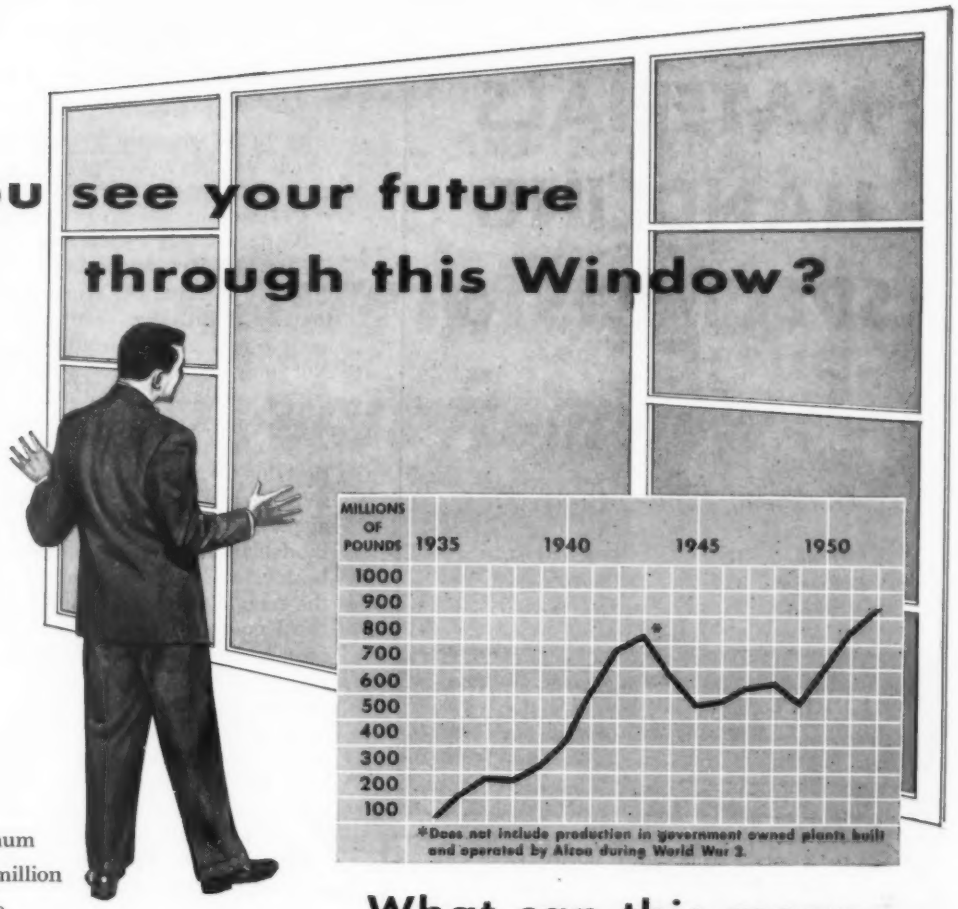

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ENGINEERS AND ENGINEERING EDUCATION

(*Continued from page 16*)

them to be spent in localities and for purposes of which they do not approve. By this action government destroys the incentive to labor, to save, and to risk – the foundation stones of our free economy.

It appears that we are now running away from the ideas which have accounted for everything peculiarly good about America. We Americans are now letting the Old-World ideas – from which we originally ran away – replace our peculiarly good American ideas. Not only is our agency of force – government – without practical limitation, except as political expediency suggests, but millions of Americans in every walk of life – teachers, wage earners, clergymen, captains of industry, farmers, doctors; in short, persons from all categories – are actually inviting the agency of force to increase its activities. They do this by demanding that government subsidize them, their businesses, or their communities in order to "promote the general welfare." It appears that faith in what man can accomplish voluntarily, if his creative energies are free, is declining. Faith in what man can accomplish if coerced by the agency of force is increasing. If there are any corporate managers who doubt this, let them look at their own annual reports and observe the trend in the income-tax ratio over the past 40 years.

In 1909 (the first year for which I have the figures) the taxable income of corporations reporting net income was 3 billion 590 million dollars. The federal income tax was 21 million dollars, or only 9/10 of 1 per cent of taxable corporation income. In 1951 the taxable corporate income was 42 billion 900 million dollars, and the federal income tax was 23.4 billion, or 55 per cent. If to the federal income tax there are added other federal taxes and state and local taxes, the total tax bill becomes 32.7 billion, or 76 per cent of the total income of business firms.

Thus we see that, from 1909 to 1951, the participation of the federal government in the earnings of corporations increased from 9/10 of 1 per cent to approximately 55 per cent. And if the comparison is made between the amounts paid to the federal government and the amounts paid to the owners of the business – the stockholders – the results are even more shocking. In 1951 the total of the income tax payments to the federal government, by the largest company in each of the 20 largest industries, was three times

(*Continued on page 42*)

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ENGINEERS AND ENGINEERING EDUCATION

(*Continued from page 40*)

the total amount that was paid by them to the owners of the businesses. That is, for every dollar set aside for federal taxes and dividends by these companies, $0.75 went to the federal government and $0.25 went to the stockholders. After that, an additional generous cut of the dividend payments was taken directly from stockholders by the government for personal income taxes. How long will American investors be willing to save and to risk their savings in American industry in the face of such powerful discouragement? And whence will come the increased quantities of the products of industry and the new jobs necessary to serve a rapidly increasing population if the risk-taking investors disappear?

It is quite evident that the function of government, as originally conceived by the leaders of the American Revolution, has been vastly corrupted in recent years. The blame lies with all of us. We have allowed those liberties which were so jealously guarded by the founding fathers to go by default in our preoccupation with the pursuit of material comforts and conveniences. We are suffering the fate of all men who permit others to do their thinking for them.

So much then for the function of government. What shall we say about our duty to God?

I have long believed that, in a completely moral society (one wherein the behavior of all persons is in conformity with the absolute values of Christian morality as summarized by the Ten Commandments and the Golden Rule), there would be no need for any law or for any formal government. Since man is an imperfect creature and it is clear that all individuals will not conform to this moral code at all times, government is provided to apply the restraints necessary to keep liberty from turning into license, to prevent some men from interfering with the freedom of others.

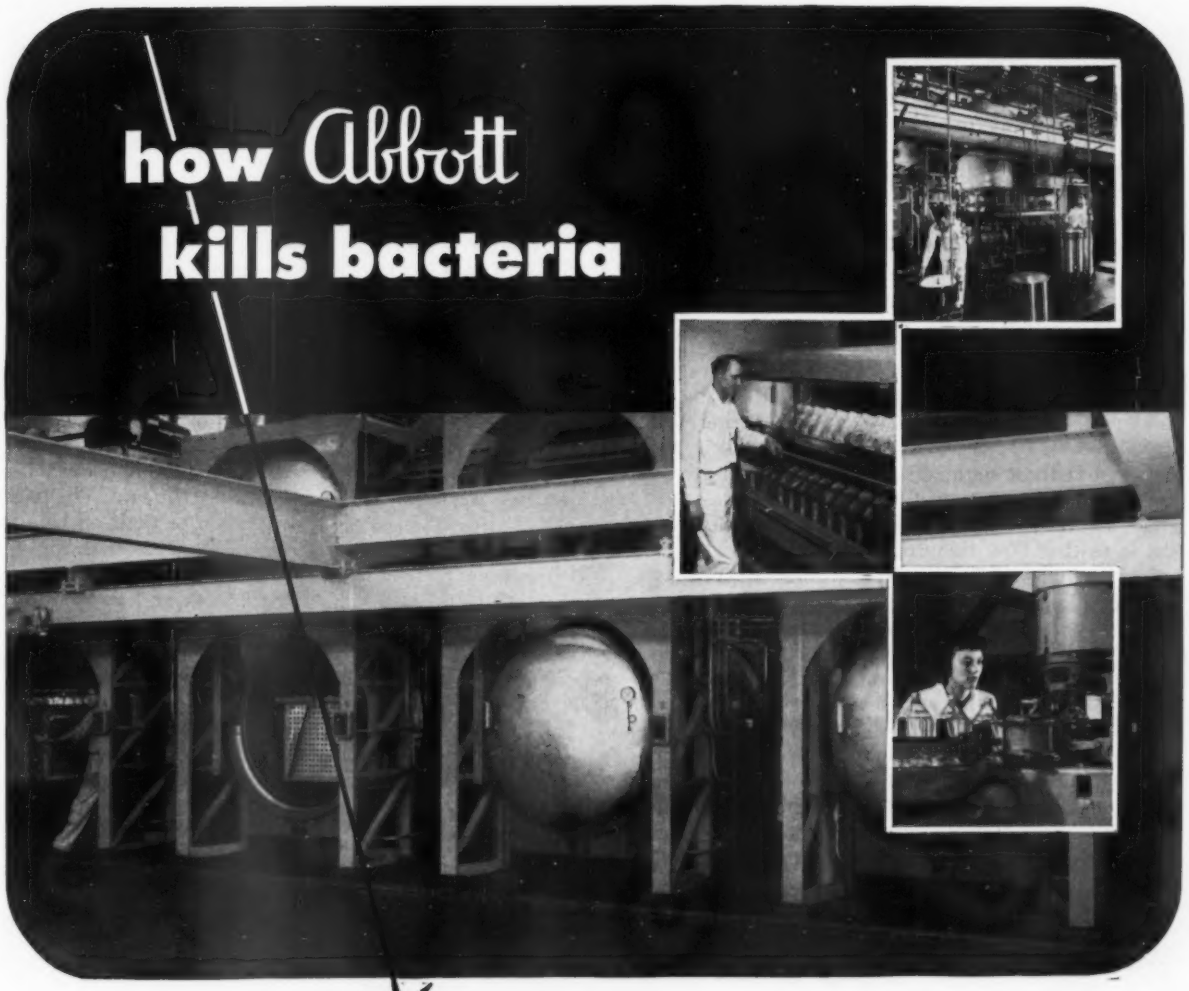
If we think of complete conformity with the absolute moral values, those changeless and timeless rules for human behavior, as the "base line," it becomes evident that as we humans move farther and farther away from that base line, we need more and more government restraint to keep us from destroying each other. Finally, when we reach the extreme of complete disregard for all moral law and we give free rein to our animal instincts, it is clear that we can survive only in an absolute dictatorship where not only our actions, but our very thoughts, are controlled by the force of government.

What is the outcome of such a state? As Lord Acton, the British historian, has so well stated: "All power tends to corrupt. Absolute power corrupts absolutely." History has shown that in such states the dictatorial power is eventually corrupted and society descends to the level of a completely immoral anarchy. This is the story of the Dark Ages — that thousand-year period of degradation of humanity.

This then is the function of God, or of the moral law, or of natural law, as you may wish to call it; namely, to enable us to use our liberty in a manner

(*Concluded on page 44*)

how Abbott kills bacteria



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ENGINEERS AND ENGINEERING EDUCATION

(*Concluded from page 42*)

such as to preserve our liberty. Only if we establish our relationships to God and to our neighbors on the highest level of service to both can we avoid dictatorship. That, I believe, is why we see so many references in these troubled days to "faith and freedom." Men are beginning to see that without faith there can be no freedom!

Now, you may ask, what has all this to do with engineering and engineering education? I believe it is this: engineering is generally conceded to be the most realistic of all professions, the most "practical," if you please. If this be true, and I believe it is, then we must instruct engineers in the function of government and the function of God, since without a knowledge of those functions and a conformity with the laws that flow therefrom, all engineering "good works" will come to naught. We must appraise the values of engineering works in terms of their effects on *both* our material and our spiritual standards of living. Only a working knowledge of the function of government and the function of God will enable us to make such an appraisal!

This point of view may be regarded as pure idealism, and too lofty for the everyday "practical" problems of living. But the background of an experience of more than 40 years in the practice of engineering, in many lands and among many peoples, gives me the deep conviction that *only the ideal is practical.*

APPRAISAL OF SUBURBAN MIDDLE CLASS LIFE

(*Continued from page 21*)

great deal of emotional instability enters into the home regime, varying between periods of hysterical attempts at discipline and those bordering upon euphoria wherein comradery and the joy of living almost reach the psychotic. In such a nigh neurotic environment the children are spoiled, indulged in, and selfish. Usually they get their ways, unless the parents are tyrants. Tyrants are they who have the fortitude to withstand the debilitating surroundings and raise their children with more than lip service to morals and spiritual and religious values.

As might be expected, violent disagreements between suburban parents and their children occur with great regularity but it is the latter who win. The parents dread the loss of the affection of their offspring. These are bred amid luxury and license with an almost complete disregard for the significance, responsibility, and meaning of hard work and application. Household chores are beneath their dignity, study is for the grinds. Respect is for weaklings. Law and order exist for the poor on the other side of the tracks. When one observes the growth and development of suburban children, it becomes only too clear why it is that rarely does an American business flourish beyond the third generation of family ownership. The reason becomes clear for the great vertical mobility within the American class structure. The children learn to de-

(*Continued on page 46*)

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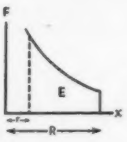

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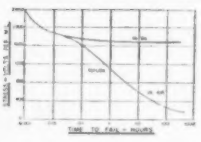

THIS GRAPH shows the relative potential gradient in cables where: Area E represents the impressed voltage, r is the radius of the conductor, R is the radius of insulation, F is the volts per unit stress at any point x distance from the center of the cable.

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PFGV-7500-16	16	19	7500	.150	.040	.88	302	188	50.00
PFGV-10000-20	20	7	10000	.160	.050	1.31	415	200	65.00
PFGV-5	20	7	12000	.205	.074	.60	403	162	100.00
PFGV-13000-14	14	41	13000	.240	.075	1.13	319	173	115.00
PFGV-7	20	7	13000	.280	.100	1.86	380	130	115.00
PFGV-15000-16	16	19	15000	.280	.092	1.48	373	163	125.00
PFGV-10000-10	10	37	13000	.330	.090	.88	230	144	175.00
PFGL-10	10	1	20000	.370	.124	1.23	318	162	270.00
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TEST #1 AT MASSACHUSETTS INSTITUTE OF TECHNOLOGY

AMP terminal connections (which had been subjected to salt spray) were placed in series with the input of a high gain, wide band pass amplifier (originally developed for checking thermal noise in R.F. input circuits). Dr. Wiesner's results, after testing AMP terminals, substantiate "the unlikelihood that metal-to-metal contact as it exists in crimped solderless connections would be expected to develop noise"

TEST #2 AT AN ARMED FORCES TEST LAB

Since a terminal has but a few milliohms resistance, this test required a special transformer to match this low impedance to the input of the amplifier, sensitive to levels of 0.2 micro volt. 60 AMP solderless terminals crimped to short lengths of wire in series, a similar number of carefully soldered joints, and a single piece of solid wire of equivalent R, were compared.

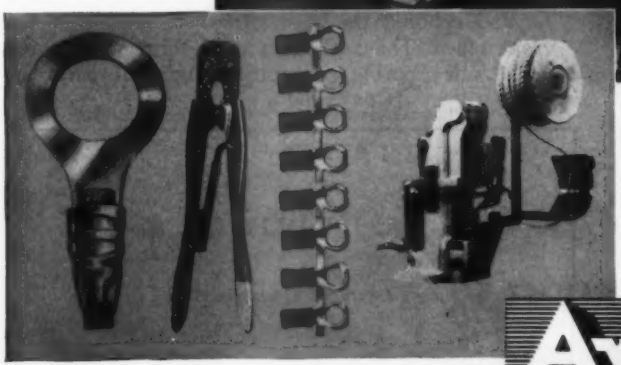
No noise difference was detectable between any of the three.

TEST #3 AT A PROMINENT UNIVERSITY LAB

7,000 AMP solderless connectors were crimped to short lengths of wire in series making a chain of terminals 340 feet long (see illustration). After aging for two years in an unfavorable atmosphere these 14,000 connections in series were tested at radio frequencies up to 20 megacycles.

AGAIN—Noise measurements were down to thermal magnitude.

(Copies of all test results available on request to our ELECTRONIC DIVISION.)



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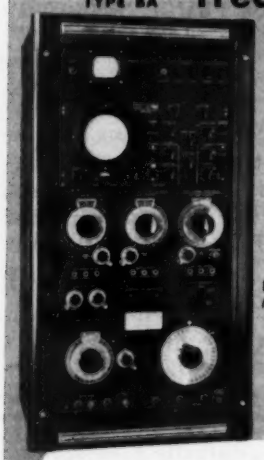

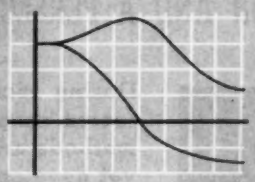

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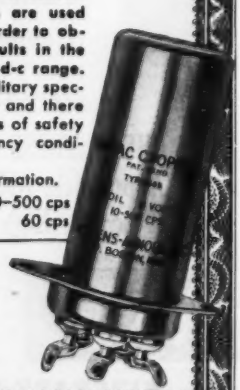

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APPRAISAL OF SUBURBAN MIDDLE CLASS LIFE

(*Continued from page 44*)

mand — and to expect to be satisfied — without knowing how to give, how to share, or how to strive and struggle for their own needs. The parents have been unable to inculcate in their children self-esteem or the pride of workmanship, although they have taught them to howl about the pride of ownership.

The growth of power of Parent-Teachers Associations in the suburbs is traceable to the disintegrating influence of the family unit. Religious observance and church attendance, which had been sincere personal obligations, have degenerated into arduous tasks, rarely indulged in except under compulsion or upon the minimum of holydays. Into this void have plunged the educators, offering every conceivable inducement in the name of better parent-teacher relationships. The lists of programs and activities are so varied and far-reaching that the original purpose is long forgotten and buried under a plethora of titles and causes. The insinuation of such suburban educators, into the life of the communities, is producing profound schisms and deep-rooted resentments. A new bureaucracy is in the process of creation, and those who rise to challenge it are invariably insulted as "Fascists" or "dupes of the real estate lobby."

Clever manipulators within suburban school systems are rapidly absorbing, under their aegis, many of the social functions of the home and/or the church. Such transference of obligations is supinely accepted and welcomed by fathers and mothers who prefer that others bring up their children. Such freedom from the task of molding character presents them with added leisure for teas, bridge, golf, the races, vacations, and other meaningless waste of time and lives.

Parent-Teacher organizations have a basically laudatory purpose. However, if the school superintendent has a dominant, willful character, the local suburban group degenerates into naught but an audience for his pontifical pronouncements. The suburban women flock at his beck and call, always with the dread in their souls that independent expression of thought would be considered radical enough to reflect adversely upon the scholastic standings of their children. Rarely do the teachers speak their minds beyond echoing the expressions enunciated at the front office. Thus, it arises that, through fear, the P.T.A.'s of suburbia accomplish naught but reflect the

(*Continued on page 48*)

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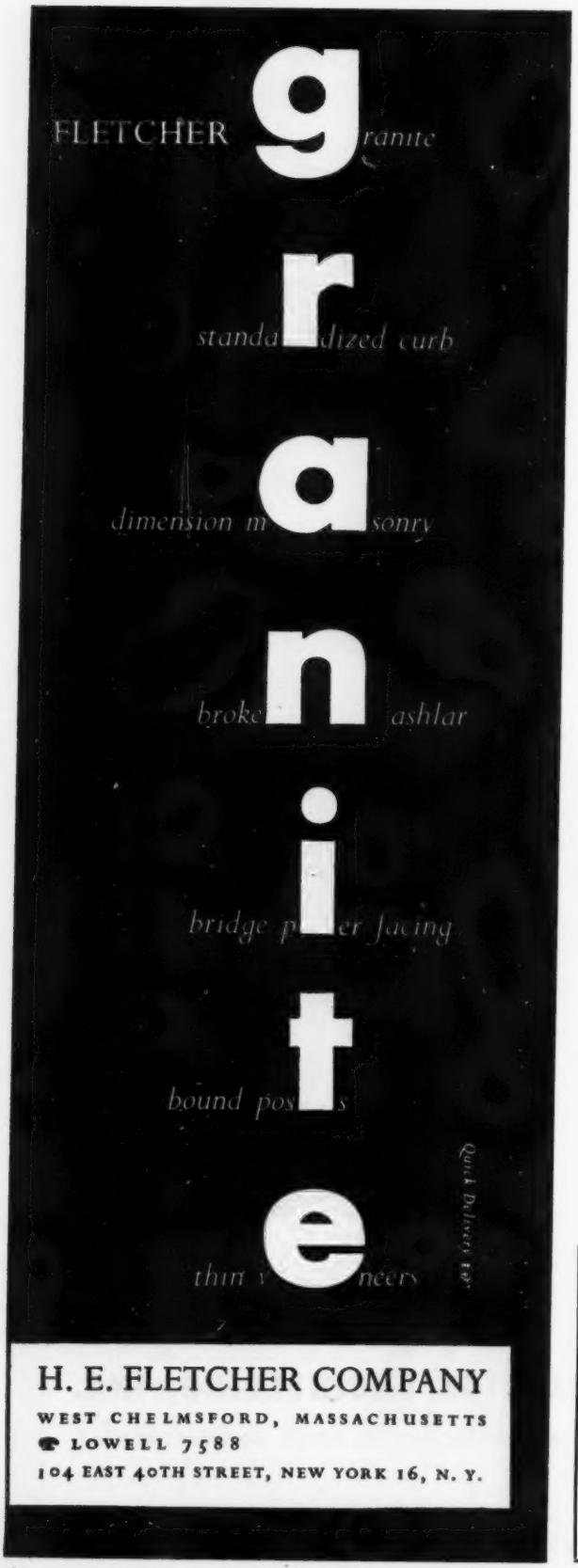

APPRAISAL OF SUBURBAN MIDDLE CLASS LIFE

(*Continued from page 46*)

character and beliefs of the school superintendent. Suburban parents, through their spineless acquiescence, irreparably harm the education of their children. They salve their consciences, however, by feeding themselves at numerous P.T.A. teas and affairs. As a group, suburban women are ready to allay anxiety through oral gratification.

All political observers recognize the curious phenomenon that when Mr. and Mrs. Democrat move from the city, through a peculiar alchemy, almost invariably they metamorphize into Mr. and Mrs. Suburban Republican. Above the Mason-Dixon line, the Democratic party claims to represent the masses and for years has advocated reforms for the benefit of the common man, whereas their antithesis is the conservative Republican party. While in the city, the man and wife had not ascended to their position of economic status and were still of a mind close to the thinking of the lower-class level. They themselves were not far removed from it, and could well afford to be sympathetic to Liberal plans – but once they cross the border, all changes. They are now on the other side, physically and spiritually. The insecurity inherent in middle-class success demands conservatism. Fear and selfishness indicate it. The Republicanism of the suburbanite is completely different in character from that of the remainder of the state, where individualism is the source of its power rather than the insecurity of suburbanites.

A corollary that follows from the thesis that the well-to-do suburbanites are conservative is that they must necessarily be conformists. Acceptance by neighbors is a prime essential to compensate them for their feeling of insecurity. This is evident in the operation of that tool of social control, gossip, about which I had written previously.† They dread being apart, or dissimilar – a condition that little disturbed them when they were city dwellers, for the walls of their apartment cages segregated them from all others in the building. But once in the suburbs they need each other, for the spiritual uplift implicit in numbers. They must not be alone! In the city there were always ever-present relatives to call upon in an emergency, while in the suburbs they find themselves quite alone. For many reasons, therefore, must Mrs. Suburbs con-

† "Gossip as an Element of Social Control," The Technology Review, **52**:88 (December, 1949).

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form, for the problems essentially devolve about her when help is needed. Paid workers can never substitute for the loyalty and experience of a mother or mother-in-law when illness strikes.

Mr. and Mrs. Suburbs entertain prodigiously, and in turn, receive reciprocal invitations. But for all their parties, dinners, and dates they enjoy few friends. The acquaintanceships are often upon a superficial level, resting essentially upon convenience of neighborly proximity, rather than upon a community of interest and understanding. Suburban gatherings are devastatingly dull and shallow, held together by a mortar fashioned of food, drink, and gossip. Rarely does intellectual conversation or interchange of views hold sway for any protracted length of time. Card games generally follow food, prolonging an intellectual void.

Some ambitious hosts attempt to inject life into their gatherings through the addition of semiprofessional talent. Thus a magician may entertain, as an invited guest, or a local lion may expound. But even these shots into the arms of suburban comradery are obviously superficial. When the evening is over, all look forward with dread to the next one, knowing full well that soon it will be their turn. The latter remarks do not apply if the participants enjoy evenings of cards with jokes and drinks on the side. Such fare can be had constantly at the home of most suburbanites — if it is liked to the exclusion of any other social form of communal relaxation and gathering.

Frequently it happens that the economic position, which the suburbanites attained, evolved from fortuitous circumstances combined with a dogged perseverance and constant application on the part of the husband. He might be lacking a college education — a fact which apparently did not deter him from becoming successful in business. His wife, however, usually realizes that such an education is one of the established steps recognized in the process of vertical social mobility. Whereas her husband might have been lucky, Mrs. Suburbs prefers that her sons be given every opportunity, if for no other reason than to help the luck. Her husband often sees no especial value in a college education, as he needed none to ascend to his own position in life. If he operates an enterprise employing people, his son, as often as not, enters the business upon graduation from high school. If Mrs. Suburbs has her way, the boy continues into college, even if it means going to an easy one. However, with the lure of a ready, lucrative position, seldom does he complete his education. Wealth does not connote enlightenment.

(*Continued on page 50*)

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APPRAISAL OF SUBURBAN MIDDLE CLASS LIFE

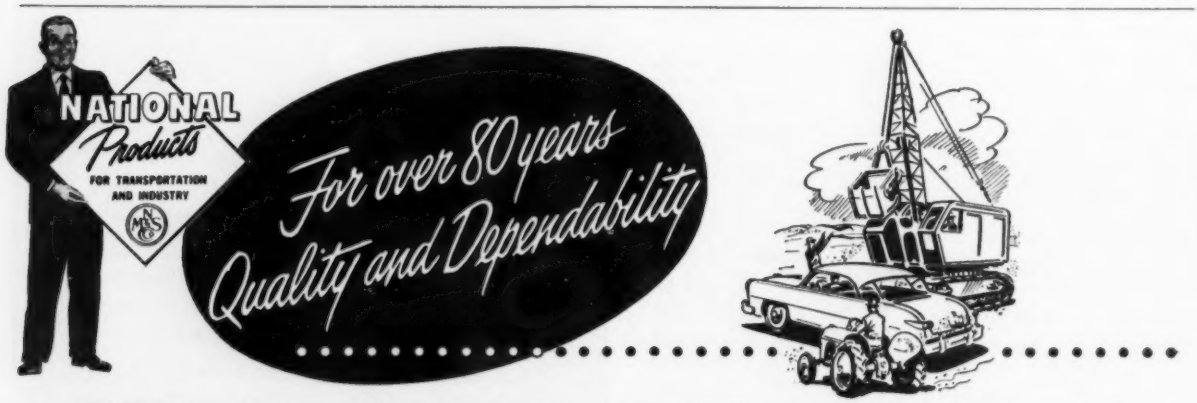
(*Continued from page 49*)

The operation of our democratic way of life is a facet in the success of the suburbs, yet few participate actively in the local civic associations. Rarely are they acquainted with their community's problems, merely giving lip service to the mechanics of democracy. Of course, they may become vociferous about election time, but they do not take part. An especially flagrant condition may exorcise them, but not beyond challenging someone else to do something about the situation. If it should ever come to pass that either man or wife becomes deeply concerned, he or she may help form committees, help arouse interest, call upon the lawmakers – but unfortunately both are blessed with an extremely short-duration level of political interest. Their enthusiasm is like a bright, momentary flash, which is quickly gone. Suburban politicians know this weakness and take full measure of every advantage. If the suburb is a very small one, with residents closely knit through ethnic and religious similarities, this criticism may not apply. Under such conditions local political enlightenment and interest is often upon a very high level. But this is infrequent. Very small, closely knit suburbs are the exception.

Some economists define the standard of living as that level of economic life below which an affianced pair will not marry until they can be sure of maintaining it. This concept does not apply to the upper echelons of suburban middle class for the simple reason that its youths do not have to struggle to attain or maintain it. Any time that a couple wishes to marry, the young man and woman expect that their home will be supplied to them. That problem is not their worry. Custom dictates that the bride's parents set them up completely, with home and furnishings. The groom's parents know it is their obligation to supply the wherewithal to live on, in the form of a good-paying position, or a very substantial cash gift to cushion early reverses or difficulties.

After observing the operation of the aforementioned parental obligations, the writer has come to the reluctant conclusion that the motivating force is prompted not through any deep-seated love for their children but rather by sheer egotism on the part of the middle-class parents. They would feel disgraced and ashamed if their friends knew that their children were obliged to work and struggle to attain positions in life. They also recognize that the more they do for their children, the greater becomes the dependence of the latter. Although it is self-satisfying for the parents to have their married children beholden to them, yet the corrosive action upon the characters of the young couples becomes evident in the many economic and emotional crises that arise with the years. They are ill-prepared for the vicissitudes of life, for their affluent, indulgent parents are always available to insinuate themselves as props and leaning posts.

The middle-class suburban family is not a spiritually healthy unit of our American society. Many of its members are well aware of the situations, although



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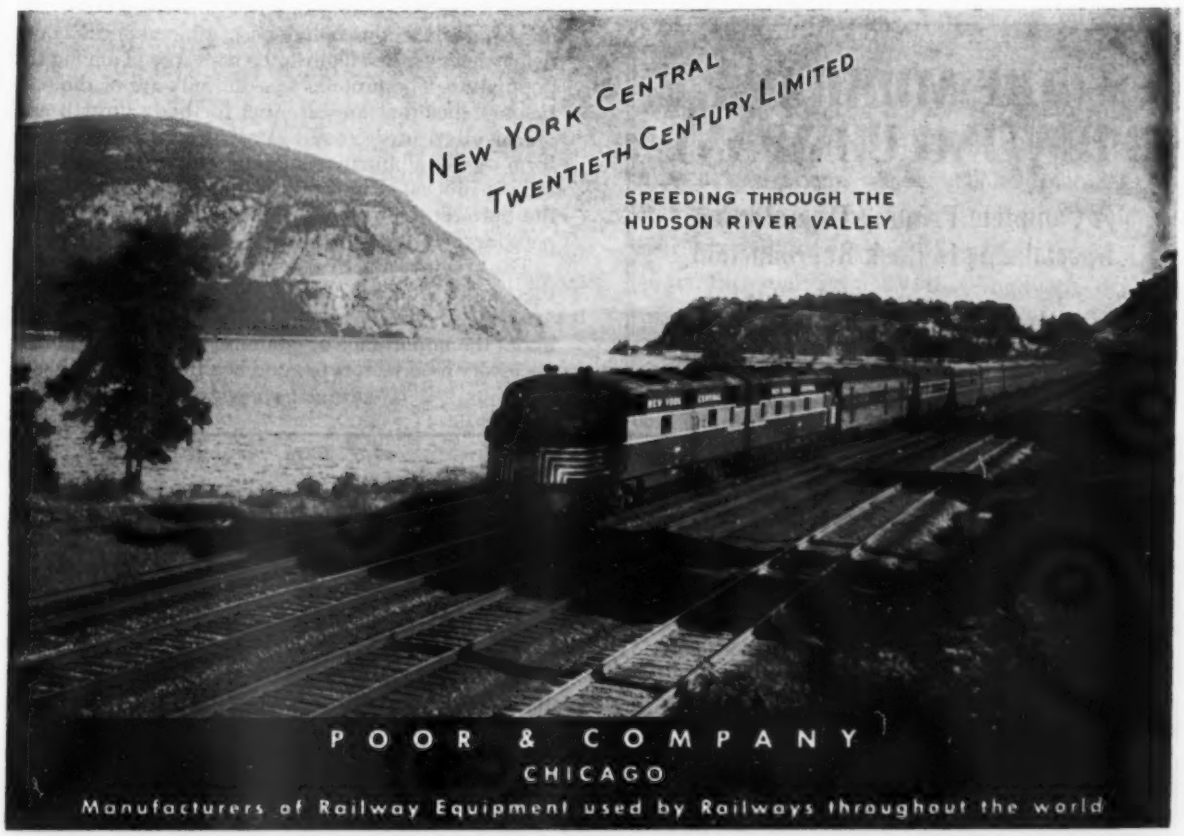
rarely do any take the necessary steps to ameliorate the conditions. There are very sound reasons for the lack of participation by the men from this stratum of our life in the civic affairs of the various communities, local and otherwise. They are beset by fears and fatigue; afraid of retaliation by governmental agencies and individuals, or by labor organizations; and are just plain tired. Momentary enthusiasm may be kindled periodically over some local neighborhood problem, but sustained effort upon any level of interest in any category is almost unheard of. In addition, there is no leadership for the middle class. That is bad, for it is believed that if the middle class is sick so is our nation.

Within recent years a profound metamorphosis has taken place within the American body politic. Whether or not it is a healthy change, the future will divulge, although to this observer the emerging forms are not soundly fashioned. The ever-expanding compulsory social-security laws, in all their ramifications, coupled with low-cost housing, negatively affect the drive and desire for vertical mobility and social change. Whether or not one approves, the contrary democratic process of wealth and reward had offered the necessary impetus to great effort to create, in our country, the nation it had become. The freezing of social ranks has received a powerful stimulus since the Roosevelt regime, and a class consciousness — hitherto always condemned as deleterious to our national welfare — has emerged. As might be expected, all strata of society are affected, the middle class suffering more than the upper class, since the holdings of the middle class are more precarious and are much slimmer.

Although, as Americans, we reject all the communistic tenets and decry the spurious glory of their highly vaunted propaganda and philosophy, yet we accept with apparent patience and seeming sympathetic silence, the selfsame ends through taxation and a warped messianic complex. Wealth is confiscated through taxation. Acquisition is discouraged and incentive for further gain, ethically achieved, is considerably diminished. On the one hand, wealth is taken away; and on the other, it is distributed to farmers to curtail production. All manner of benefits are offered to workers, rendering them thoroughly class conscious. The paternalistic state protects them with assured compensation through the various vicissitudes of industrial life: illness, unemployment, old age. Even homes are built for them. Everything is done through a magnificent grinding of those who "have" for the benefit of those who "have not." Incentive is becoming a marginal utility, flowering only in the fertile brains of a new aristocracy — the ever vociferous labor demagogues. The creation of a single proletarian whole is being attempted in America. Just as breathing is a "right," so have many new rights been born, and these have been superimposed from above upon the American public rather than soundly developed from below as a grass-roots growth.

Can it be that our middle class is being deliberately, officially ground to create the condition prophesied by Marx, as described in the third paragraph of this article: "When two classes remain society collapses"?



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TECHNOLOGICAL DEVELOPMENTS IN THE DAIRY INDUSTRY

(Continued from page 24)

per person per day), although we know that great numbers still do not receive an optimal dietary. We know of no food-processing industry to whom the significance of that last phrase applies with such force as to the dairy industry.

Ways and Means

Thus, after weighing the factors of the increasing pace of technological developments and the mounting pressure of population on food production, it would appear that the dairy industry will have to give most careful – indeed exhaustive – thought to ways and means of increasing its own yield. It can, fortunately, increase yields in more ways than one. First of all, it can increase basic unit milk yields per cow. The dairy industry has made major strides in this direction, judging from the progressive record of the average milk production per cow over the past few decades. Nevertheless, we assume even these basic unit yield possibilities have not been attained at the expense of still further substantial increases in the future.

The dairy industry can also increase yield on a qualitative basis through more efficient consumption of milk and its products. Any student of nutrition knows that if a nation's diet is composed of cereal-potato calories to the extent of 70 per cent or more, its people are unlikely to obtain an adequate diet. On the other hand, if the proportion of calories derived from animal products is 35 to 50 per cent, mineral and vitamin deficiencies are less likely to be widespread among the population. The proteins in skim milk are of the particular types that are essential for body growth and are involved in defense against disease. An extreme form of the elimination of food values occurs when milk is processed into butter and the skim milk and the buttermilk portions are discarded. This still happens far too often.

The quantity and quality of protein supplied by the diet are of vital importance to an individual's health at every age level. Although the public has heard a lot about the importance of vitamins, minerals, and other accessory food factors to good health, they have heard

(Continued on page 54)

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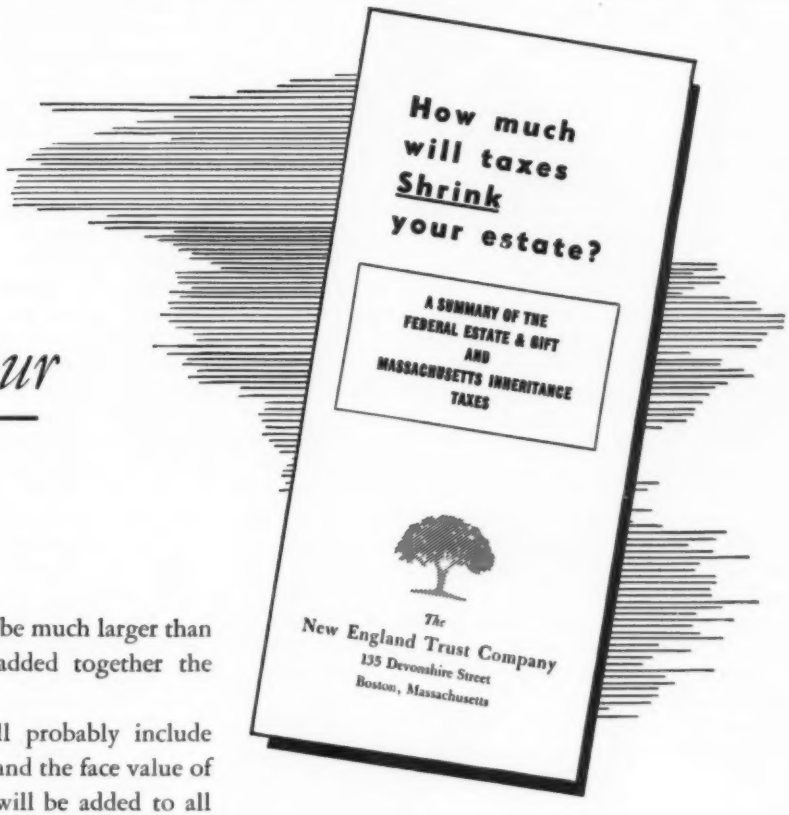
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TECHNOLOGICAL DEVELOPMENTS IN THE DAIRY INDUSTRY

(Continued from page 52)

little about the significance of the proper quality of protein. For, wherever total quantity or average quality of the protein consumed falls significantly below accepted standards for good nutrition, the signs and symptoms of protein deficiency (hypoproteinosis) may appear. Mild to moderate hypoproteinosis is observed in the United States, as evidenced by biochemical or clinical observations of poor protein nutrition.

Nutritional research has demonstrated that amino acids are utilized in definite combining proportions. Those proteins which contain amino acids in approximately the same proportions in which they are utilized in the body – for example, the three typically high quality protein foods, eggs, milk, and meat – are most effectively assimilated by both adults and children. For most efficient utilization of amino acids from the diet, they must be present in foods in the proper proportions. Such results can be attained by the following means: (1) Use of combination of food proteins whose amino acid proportions exert a supplementary effect upon one another. (2) More even distribution of high-quality protein among the daily meals. (3) Use of specific amino acid supplements to low quality proteins to achieve amino acid proportions that conform to nutritional needs.

Several factors militate against the solution of the protein problem of human nutrition by food combinations alone. In the United States, a rapid population increase may, in time, place a strain on protein resources by reducing the potential per capita supply of high-quality proteins that can be applied for improvement of an over-all amino acid balance. While we can improve nutritional circumstances by amino acid fortifications, we are not yet assured that consumers will accept foods so fortified. It seems technologically possible, however, that by proper combination of available proteins and by small additions of supplementary amino acids to staple foods, we might be enabled to effect the equivalent of a 50 to 100 per cent increase in dietary protein without increasing the amount of food grown.

One important characteristic of milk that the dairy industry should not overlook is the fact that the amino acids contained in skim milk are in such proportions and amounts as can contribute to an improvement of amino acid balance in an individual's protein nutrition. In addition, those same amino acids can supplement other foods to secure more efficient utilization of the total protein intake. For example, if consumed without milk some breakfast cereals would be of a low order nutritionally. Yet, when they are eaten with milk, whole or skimmed, the total protein intake is made available. The total nutritional value is greater than if cereal and milk were digested separately. Obviously, the nutritional value of skim milk needs to be more fully exploited. Moreover skim milk needs to be produced more economically to meet the threat of

(Concluded on page 56)

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TECHNOLOGICAL DEVELOPMENTS IN THE DAIRY INDUSTRY

(Concluded from page 54)

possible fortification of staple foods with appropriate amino acids.

At the risk of being blunt, it would appear that the dairy industry may find it has a possible and formidable competitor in the manufacturing chemical industry. The four essential amino acids most needed for improvement of human dietaries are lysine, methionine, threonine, and tryptophane. By addition of these amino acids, many important low-cost foods can be converted to high-quality protein sources. In areas where bread and other foods derived from wheat are important staples, possibly substantial over-all improvement in protein nutrition can be realized by fortification with lysine alone. Combinations of these four amino acids can also be effectively utilized to enhance the protein nutritional quality of other dietaries, such as those based on rice, potatoes, and legumes, for example. In many instances it is not at all unrealistic to predict that the effective supply of dietary protein can be increased markedly through mere amino acid supplementation, provided the basic economic problems of combining or adding these four amino acids can be solved.

Dairy Industry's Opportunity

If it will but realize the nutritional value of milk's protein constituents and capitalize on them, the dairy industry has a great opportunity to make mighty contributions in solving the coming population pressure problem as well as that of existing dairy surpluses. The industry should not overlook milk's great possibilities and opportunities of enhancing the overall acceptabilities and nutritional values of a wide variety of nondairy food products. In short, the technological future of the dairy industry appears to be tied up in successfully solving (1) the problem of the increased production of cheaper milk, and (2) the all-out exploitation of the high-protein quality of its skim milk supplies. Nutritionally and economically, the dairy industry appears to have lost the battle of edible fats. Its future fate as a technological leader among the food industries – and, in fact, its own industrial pre-eminence and survival – may well reside in the outcome of the battle of high-quality proteins.

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PROMISE OF TOMORROW

(Concluded from page 26)

than we have hitherto mastered. As we scan the future, we anticipate that we shall face more, rather than less, of these abstruse issues.

Where do we turn for strength? I believe that many of us will take occasion, if we have not already done so, to renew the habits of our youth and once more to seek surcease and support from the church and the concepts and the faith for which it stands. Time and again we have found our powers renewed and our insight strengthened through spiritual communion.

A great industrialist has said that it is more difficult to maintain perfection than to attain it. Recently one of our Alumni remarked to me: "It's admirable to make good; it's noble to stay good." It is heartening to know that there are spiritual reserves available to every one of us, upon which we may freely draw.

And so I come to the promise of the future. Before you lie new and fascinating opportunities. In the sunny hours of life's afternoon you may enjoy to the full the satisfactions which spring from greater accomplishments through others; from greater creativeness with others; from greater contributions for others; from greater loyalties to others; and from greater companionship with Another.

Yet the promise of the future is more than this. As you learn to apply the arts of delegation, of group endeavor, of contribution for the sheer delight of the giving, of larger and deeper loyalties, of closer communion with the Spirit, you will inevitably increase your stature, widen your outlook, enhance your worth to the world. You will continue to grow — in trust, companionship, generosity, loyalty, and faith.

This assurance of continuing personal growth is the great promise which the future holds for you.

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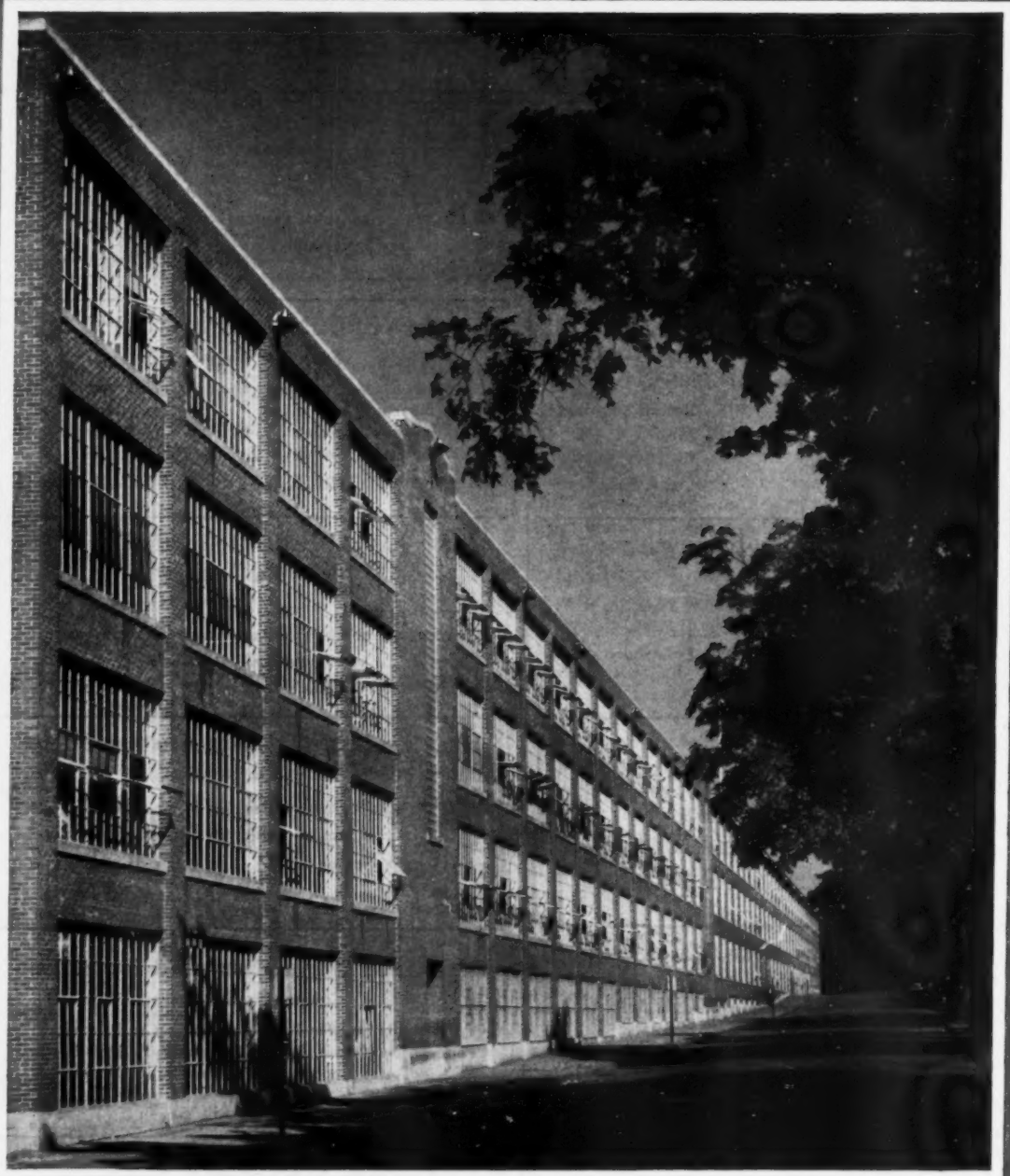

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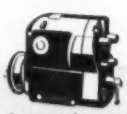

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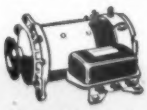

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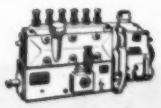

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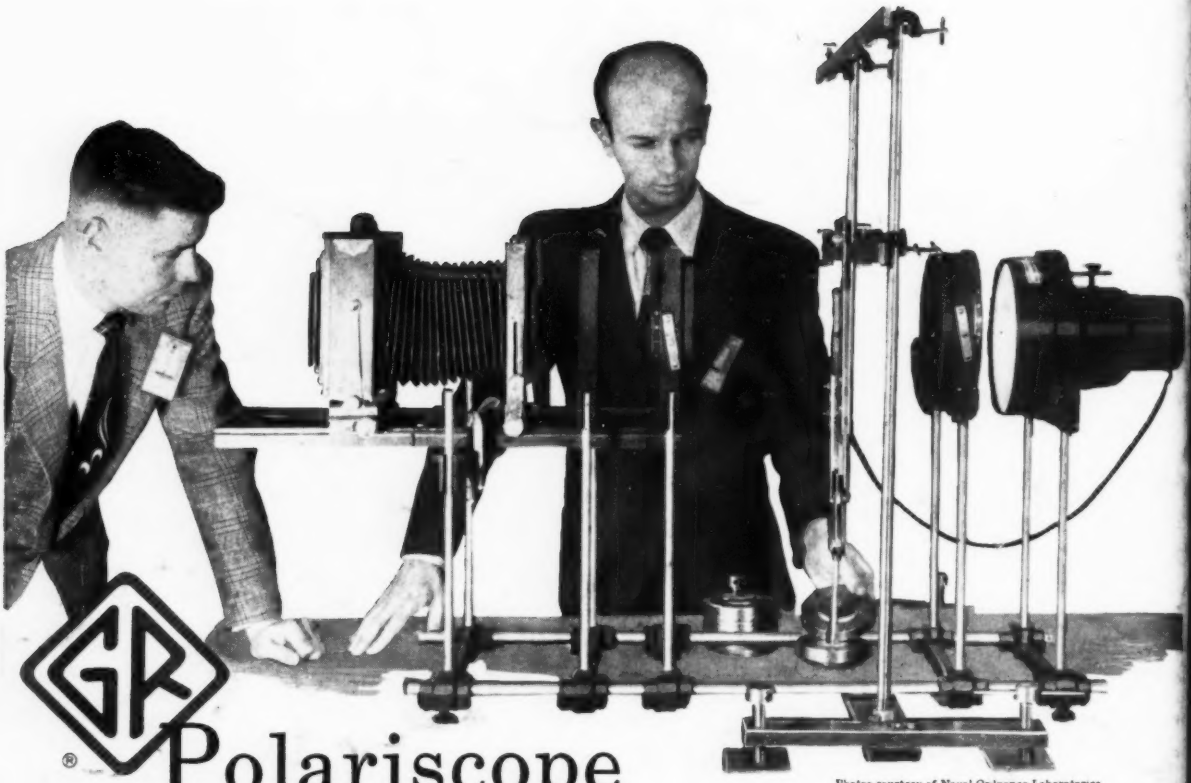


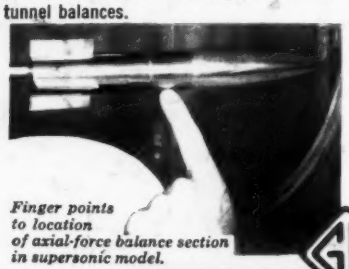
Polariscope

Photos courtesy of Naval Ordnance Laboratories

Simplifies Supersonic Wind-Tunnel Studies

The First Announced Application of Photoelastic Techniques to Wind-Tunnel Balance Design

The G-R Type 1534-A Polariscope reveals stresses in transparent, photoelastic models when they are observed under a steady polarized light. With high-intensity, short-duration flash illumination such as supplied by the G-R Type 1532-B Strobolume, dynamic stresses can be photographed as well. Both methods have been successfully applied by the Aeroballistics Design and Operations Division of the Naval Ordnance Laboratory to problems associated with supersonic wind-tunnel balances.



Finger points to location of axial-force balance section in supersonic model.

Wind-Tunnel balances are inserted internally in models to be placed in controlled airstreams. Electrical strain gages are cemented to sections of the balance structure so that acting aerodynamic forces and moments may be measured. A primary problem in obtaining accurate measurements lies in properly designing the balance structure. Another difficulty is the exact locating of strain gages on the balance so that all six force and moment components will be accurately indicated without mutual interaction among components.

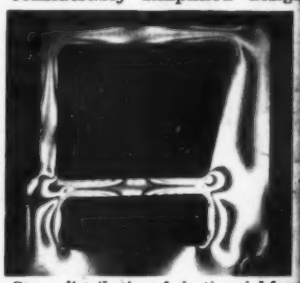
Before the development of the photoelastic technique, both problems had to a large extent been handled emperically. Optimum balance design and gage placement are too complex for ordinary analytical stress studies. The Polariscope now enables accurate visual or photographic investigations which have considerably simplified design and measurements.

A transparent model of the balance is examined in the G-R Polariscope's field of polarized, monochromatic light under loading conditions which will be encountered in the wind tunnel. The black and white fringes recorded photographically through the Polariscope are then interpreted qualitatively to give a complete picture of the stress distribution of the model.

The stress pattern enables the designer to accurately design the balance structure and to place the strain gages where the stresses will be either completely in tension or in compression. This avoids previously troublesome cancellations of effects.

The G-R Type 1534-A Polariscope is a versatile, lightweight, portable and convenient-to-use instrument, moderately priced at $490.00.

Write for the G-R Polariscope Bulletin for a detailed description of the powerful photoelastic analytical method . . . a technique which can be of use to every structural-design engineer.



Stress distribution of plastic axial-force section under simulated air load applied by the Polariscope straining members. Photograph was taken with conventional camera equipment through the Polariscope.

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